PATENT ABSTRACTS OF JAPAN

(11)Publication number : 06-133274
(43)Date of publication of application : 13.05.1994

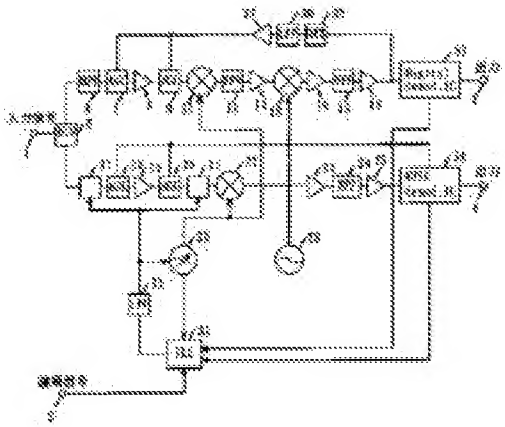
(51)Int.Cl. H04N 7/00
H04N 5/46

(21)Application number : 04-276977
(22)Date of filing : 15.10.1992

(71)Applicant : HITACHI LTD
(72)Inventor : IKEDO HIROYASU
MIZUKAMI HIROYUKI
NAGASHIMA TOSHIO

(54) RECEIVER

(57)Abstract:
PURPOSE: To receive both an NTSC signal and a high definition television signal by processing the NTSC signal with the single superheterodyne system and processing the high definition television signal with the double superheterodyne system.
CONSTITUTION: A local oscillator 26 and a PLL circuit 31 are used in common, in the fine adjustment using an AFC voltage, the AFC voltage from a high definition television signal demodulator 33 and an NTSC signal AM demodulator 34 in the circuit 31 is selected in response to a reception signal to control an oscillated frequency from the oscillator 26. Thus, the reception of an NTSC signal and a high definition television signal are received and the high definition television signal is demodulated with high accuracy. Furthermore, the high definition television signal processing section and the NTSC signal processing section use the local oscillator and the PLL circuit in common to reduce the circuit scale and a simple channel selection means in which the frequency control is implemented by the oscillator 26 only is obtained.



* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1]In a receiving set which an RF signal modulated by standard television signals (NTSC, PAL, SECAM, etc.) and an RF signal modulated by a high-definition TV JON signal are inputted, and restores to it and outputs each signal, The 1st local oscillator that performs oscillated frequency control for a high-definition TV JON signal processing part which processes this high-definition TV JON signal by which AM was carried out at least using a PLL circuit by channel selection information, The 1st frequency converter that changes a desired signal into the 1st IF signal, and the 2nd local oscillator, It is considered as a double superheterodyne system which comprises the 2nd frequency converter changed into the 2nd IF signal, and a demodulator which input the 2nd IF signal, and to which it restores, A local oscillator which performs oscillated frequency control for a standard television signal treating part which processes this standard television signal by which AM was carried out at least using a PLL circuit by channel selection information, A receiving set constituting from a single superheterodyne system which comprises a frequency converter which changes a desired signal into an IF signal, and a demodulator which input an IF signal, and to which it restores.
[Claim 2]A wave detector which detects the 2nd IF signal of a high-definition TV JON signal for AGC voltage of said high-definition TV JON signal processing part in the receiving set according to claim 1, A receiving set generating with a low pass filter which passes this detection output, and an amplifier which amplifies an output of this low pass filter to a desired pressure value.
[Claim 3]. In the receiving set according to claim 1 or 2, are contained in said high-definition TV JON signal processing part. . Are contained in the 1st local oscillator that performs oscillated frequency control using a PLL circuit, or said standard television signal treating part. One of PLL circuits and local oscillators of a local oscillator which perform oscillated frequency control using a PLL circuit are shared, A receiving set having composition which switches AFC voltage for high-definition TV JON signals outputted from a demodulator for high-definition TV JON, and AFC voltage for standard television signals outputted from a demodulator for standard television signals in said PLL circuit, and is used for frequency control.
[Claim 4]. In the receiving set according to claim 3, are contained in said high-definition TV JON signal processing part. A receiving set sharing one frequency converter of the frequency converters which change a desired signal into an IF signal contained in the 1st frequency converter that changes a desired signal into the 1st IF signal, or said standard television signal treating part.
[Claim 5]In Claim 1 or the receiving set according to claim 2, 3, or 4, The 3rd frequency

converter that inputs a local oscillation signal outputted from the 3rd local oscillator and this 3rd local oscillator, and said 2nd IF signal at said high-definition TV JON signal processing part, and is changed into a baseband signal, A receiving set forming a demodulator for high-definition TV JON signals of this baseband.
[Claim 6]A receiving set constituting the 3rd local oscillator from an oscillating circuit using a crystal oscillator, forming a counting-down circuit which carries out dividing of the local oscillation signal outputted from this 3rd local oscillator, and outputs it in the receiving set according to claim 5, and using this dividing signal as a reference signal of a PLL circuit.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application]This invention is a receiving set which can receive a high-definition TV JON signal and the usual television signal, It is related with the receiving set which carries out common reception of the signal especially compressed into a 6-MHz zone as a high-definition TV JON signal, and the NTSC signal which has a 6-MHz zone as a usual television signal.
[0002]
[Description of the Prior Art]the Television Sub-Division broadcasting formats (NTSC, PAL, etc.) from recent years and the former -- in addition, establishment of the high-definition TV JON broadcasting format is advanced in each country. In connection with this, the receiving set with little image quality and tone quality degradation at the time of high-definition TV JON signal reception has been needed also in a receiving set. The conventional single superheterodyne system Television Sub-Division receiving set is shown in drawing 13. In the figure, 1 a signal input terminal and 2 a channel select signal input terminal and 4 An image and a voice signal output terminal, 17 and 21 -- variable tuning circuits, and 18 and 20 -- variable attenuator and 19 -- an RF amplifier and 22 -- as for a local oscillator and 29, an IF amplifier and 24 are [a PLL (phase locked loop) circuit and 34] AM demodulation machines a frequency converter, and 23 and 25 a low pass filter and 31 an IF filter and 26. The NTSC signal is used and explained to the standard television signal as an example after this.
[0003]By the NTSC signal inputted from the signal input terminal 1, among the RF signals by which AM was carried out a desired signal, It passes selectively in the variable tuning circuits 17 and 21 which follow the oscillating frequency of the local oscillator 26 and change the center frequency of the pass band, it amplifies or decreases suitably with the variable attenuators 18 and 20 and RF amplifier 19 so that a desired signal may serve as a desired receiving level, and it is inputted into the frequency converter 22. It mixes with the local oscillation signal from the local oscillator 26 which forms feedback by PLL circuit 31 and the low pass filter 29 so that it may oscillate on the frequency corresponding to a desired channel with the channel select signal inputted from the channel select signal input terminal 2 in the frequency converter 22, The IF signal of 45 MHz bands is outputted. An IF signal is amplified with the 1st and 2 IF amplifiers 23 and 25, and only a desired zone is passed by IF filter 24 which comprises an SAW filter etc., it gets over with the AM demodulation machine 34, and the image and audio signal of baseband are outputted. AGC is performed using the inside and the variable attenuators 18 and 20 of the AM demodulation machine 34. AFC carries out fine control of the oscillating frequency of the local oscillator 26, and performs it.
[0004]

[Problem(s) to be Solved by the Invention]However, the above-mentioned receiving set receives the usual television signals, such as NTSC, and reception of the high-definition TV JON signal is not taken into consideration. Receiving both usual television signals and high-definition TV JON signals is not taken into consideration, either.
[0005]Both the purposes of this invention can receive a usual television signal and high-definition TV JON signal. It is in providing the receiving set which can receive the NTSC signal which has a 6-MHz zone as a usual television signal especially, and the signal compressed into a 6-MHz zone as a high-definition TV JON signal.
[0006]
[Means for Solving the Problem]In order to attain the above-mentioned purpose, in this invention, a single superheterodyne system performs NTSC signal processing, By a TERODAIN method, consider high-definition TV JON signal processing as composition to perform to a double supermarket which has the 1st and 2nd mixer, and to it about the double superheterodyne system. Set the 1st IF signal frequency as 1 GHz or more, and a band pass filter which has display flatness within a zone which does not degrade a recovery of a high-definition TV JON signal in the 1st IF filter, and a low group delay deviation is used, An SAW filter for high-definition TV JON signals was provided as the 2nd IF filter, and a demodulator for highly minute signals was formed as a demodulation section.
[0007]
[Function]In this invention, the receiving set which can receive an NTSC signal and a high-definition TV JON signal can be provided by the above-mentioned composition. By what a channel selection circuit, a local oscillator, and the 1st mixer are shared at the time of an NTSC signal and high-definition TV JON signal reception, and the 2nd IF filter or an IF filter, and a demodulator are individually formed for in an NTSC signal and high-definition TV JON signals. The receiving set which receives the NTSC signal which circuit structure reduced, and a high-definition TV JON signal can be constituted.
[0008]
[Example]Hereafter, Drawings explain working example of this invention.
[0009]Drawing 1 is a block diagram of the receiving set in which the 1st working example of this invention is shown.
[0010]In the figure, 1 a signal input terminal and 2 a channel select signal input terminal and 3 A high-definition TV JON signal output terminal, 4 the image for NTSC and a voice signal output terminal, and 5 a distributor and 6 An input filter, Variable attenuator, and 8 and 19 7, 9, 18, and 20 The 1st and 2nd RF amplifier, 10 the 1st mixer and 11 the 1st IF filter and 12 The 1st IF amplifier, 13 the 2nd mixer and 14 the 1st IF amplifier and 15 The IF filter for high-definition TV JON signals, 16 the 2nd IF amplifier, and 17 and 21 variable tuning circuits and 22 The 3rd mixer, 23 the 3rd IF amplifier and 24 the IF filter for NTSC signals, and 25 The 4th IF amplifier, 26 the 3rd local oscillator and 27 the 1st local oscillator and 28 The 2nd local oscillator, 29 and 30 -- as for the AM demodulation machine for NTSC signals, and 35, a PLL circuit and 33 are [a low pass filter and 37] AGC voltage amplifiers a low pass filter, and 31 and 32 the demodulator for high-definition TV JON signals, and 34 the signal level wave detector for high-definition TV JON signals, and 36. In the figure, the same number as drawing 13 is given to the portion which performs the same operation as Fig. 13, and explanation is abbreviated to it.
[0011]When an NTSC signal is inputted, since it is the same as signal processing described by the conventional example, explanation is omitted here. Input the RF signal of high-definition TV JON which has the 6-MHz zone which carried out the after [an A/D conversion] data

compression of the RF signal by which AM was carried out by the NTSC signal, and the HARASHIN item of high-definition TV JON, and was modulated by QAM (orthogonal-axis amplitude modulation) etc. from the signal input terminal 1, and the distributor 5 distributes, The input filter 6 divides the RF signal of this high-definition TV JON into a VHF band and a UHF band (a VHF band may be further divided into low-pass, a mid-range, and a high region.), and the zone containing a desired channel is passed selectively. To the desired channel, it amplifies or decreases suitably with the variable attenuators 7 and 9 and RF amplifier 8 so that it may be set to a desired signal level, and it inputs into the 1st mixer 10. In the 1st mixer 10. It mixes with the local oscillation signal from PLL circuit 32 which built in the reference oscillator and the counting-down circuit so that it might oscillate on the frequency corresponding to a desired channel with the channel select signal inputted from the channel select signal input terminal 2, and the local oscillator 27 which forms feedback by the low pass filter 30, The 1st IF signal is outputted. The 1st IF signal frequency is set up more than the upper limited frequency of the ground transmission band of an NTSC television signal, or a CATV transmission band in order to reduce the intermodulation interference of an input signal, etc. The mutual interference disturbance by the 1st local oscillation signal, the 2nd local oscillation signal, and its higher harmonic signal is also taken into consideration, and it is 1 GHz or more and, specifically, sets to 1.2 GHz bands, 1.7 GHz bands, 2.6 GHz bands, 3 GHz bands, etc. The 1st IF signal set as these frequency bands is selectively passed by 1st IF filter 11. The recovery of a high-definition TV JON signal needs a recovery higher-precision than an NTSC signal. In order not to degrade the demodulation characteristic of a high-definition TV JON signal, the band pass filter which has the display flatness within a zone and a low group delay deviation is used for the 1st IF filter. After amplifying the 1st IF signal with 1st IF amplifier 12, it is inputted into the 2nd mixer 13. In the 2nd mixer, it mixes with the local oscillation signal from the 2nd local oscillator 28, and the 2nd IF signal is outputted. Let the 2nd IF signal frequency be the same 45 MHz bands as the time of the present NTSC signal reception. It inputs into IF filter 15 for high-definition TV JON signals which comprises an SAW filter etc., after amplifying the 2nd IF signal with 1st IF amplifier 14. Only the zone of the reception channel of choice is passed by an IF filter. In receiving a high-definition TV JON signal, the reception channel of choice is amplified with 2nd IF amplifier 16, and it inputs into the demodulator 33 for high-definition TV JON signals, and the recovery according to a modulation method is performed and it outputs the high-definition TV JON signal by which the data compression was carried out from the output terminal 3. The outputted signal is inputted into the digital signal processing circuit which performs data decompression, D/A conversion, etc., and outputs an image and a sound, or data to high-definition TV JON. On the other hand, when receiving an NTSC signal, the reception channel of choice is amplified with 4th IF amplifier 25, and it inputs into the AM demodulation machine 34 for NTSC signals, and AM demodulation is carried out and the image and audio signal of baseband are outputted from the output terminal 4. AGC detects the signal which branched from the output of 2nd IF amplifier 16 with the signal level wave detector 35, when receiving a high-definition TV JON signal, with the low pass filter 36 and the AGC voltage amplifier 37, it generates AGC voltage, impresses it to the variable attenuators 7 and 9, and is performed. When receiving an NTSC signal, the part which ran short an inside and inside the AM demodulation machine 34 is performed using the variable attenuators 18 and 20. Using each AFC voltage from the demodulator 33 for high-definition TV JON signals, and the AM demodulation machine 34 for NTSC signals, AFC carries out fine control of the oscillating frequency of the 2nd local oscillator 28 and the 3rd local oscillator 26, and performs it. Although mentioned later, In order

to take into consideration the high-definition TV JON signal also when transmitted by the same channel as an NTSC signal, and to avoid the interference disturbance from an NTSC signal, Near [where the energy in an NTSC signal is high] an image and a sound carrier, and the chrominance subcarrier, It is required for using the signal shown in drawing 7 which does not arrange the spectrum of a high-definition TV JON signal beforehand, or the demodulator 33 for high-definition TV JON signals to provide the notch filter from which the subcarrier of the above-mentioned NTSC signal and a subcarrier are removed etc.

[0012]As explained above, reception of an NTSC signal and a high-definition TV JON signal is not only possible, but the receiving set of this example can be restored to a high-definition TV JON signal with high precision.

[0013]Drawing 2 is a block diagram of the receiving set in which the 2nd working example of this invention is shown. In the figure, the same number as drawing 1 is given to the portion which performs the same operation as Fig. 1, and explanation is abbreviated to it.

[0014]This example takes reduction of circuit structure into consideration. Namely, in the 1st working example of the above, the 3rd local oscillator 26 and PLL circuit 31 are used for high-definition TV JON signals the 1st local oscillator 27, PLL circuit 32, and for NTSC signals, Control the local oscillation signal frequency which changes the reception channel of choice into the 1st IF signal or an IF signal, and at the time of high-definition TV JON signal reception. The fine adjustment using AFC voltage to the 2nd local oscillator 28 having performed in this example. The local oscillator 26 and PLL circuit 31 are shared, the fine adjustment using AFC voltage also switches the AFC voltage from the demodulator 33 for high-definition TV JON signals, and the AM demodulation machine 34 for NTSC signals according to an input signal in PLL circuit 31, and oscillated frequency control of the local oscillator 26 is performed.

[0015]In addition to the effect described in the 1st working example, by sharing a local oscillator and a PLL circuit by the high-definition TV JON signal processing part and an NTSC signal treating part, reduction of circuit structure can be aimed at and a simple channel selection means by which only the local oscillator 26 performs frequency control is obtained in this example.

[0016]Drawing 3 is a block diagram of the receiving set in which the 3rd working example of this invention is shown. In the figure, the same number as drawing 1 and drawing 2 is given to the portion which performs the same operation as Fig. 1 and Fig. 2, and explanation is abbreviated to it.

[0017]This example also takes reduction of circuit structure into consideration. Namely, in the 1st and 2nd working example of the above, use the 1st mixer 10 for high-definition TV JON signals, and the 3rd mixer 22 is used for NTSC signals, To having performed frequency conversion which changes the reception channel of choice into the 1st IF signal or an IF signal, by this example, the mixer 10 is shared and frequency conversion is performed.

[0018]In addition to the effect described in the 1st and 2nd working example, in this example, reduction of circuit structure can be aimed at by sharing the mixer 10 by the high-definition TV JON signal processing part and an NTSC signal treating part.

[0019]Although not illustrated, the same effect as the above is acquired by sharing the 3rd either 1st IF amplifier 14 or IF amplifier 23 by the high-definition TV JON signal processing part and an NTSC signal treating part.

[0020]Drawing 4 is a block diagram of the receiving set in which the 4th working example of this invention is shown. In the figure, the same number as drawing 2 is given to the portion which performs the same operation as working example shown in drawing 2, and explanation is abbreviated to it. As for 39, in the figure, the 4th local oscillator and 50 are the demodulators for

high-definition TV JON signals in baseband the 4th mixer and 40.
[0021]This example gets over to a high-definition TV JON signal by carrying out frequency conversion of the 2nd IF signal to baseband further. Namely, in the 2nd working example of the above, the 2nd IF signal of 45 MHz bands outputted from the 2nd mixer 13 is amplified with 1st and 2nd IF amplifier 14 and 16 to a high-definition TV JON signal, After making zone selection by IF filter 15 for high-definition TV JON signals, input into the demodulator 33 for high-definition TV JON signals, and the recovery according to a modulation method to having carried out in this example. It mixes with the 2nd IF signal and the local oscillation signal of 45 MHz bands from the 4th local oscillator 40 with the 4th mixer, and the high-definition TV JON signal of baseband is outputted. Selection passage of this signal is carried out by the low pass filter 41, and it gets over with the demodulator 50 for high-definition TV JON signals in baseband.
[0022]In this example, since it can restore to a high-definition TV JON signal by the baseband of a low frequency area in addition to the effect described in the 1st and 2nd working example, the composition of the demodulator for high-definition TV JON signals becomes easy.
[0023]Drawing 5 is a block diagram of the receiving set in which the 5th working example of this invention is shown. In the figure, the same number as drawing 4 is given to the portion which performs the same operation as working example shown in drawing 4, and explanation is abbreviated to it. In the figure, the PLL circuit where 31 does not contain a reference oscillator, and 42 are counting-down circuits.
[0024]This example carries out dividing of the oscillation signal of the 4th local oscillator 40, and it is used for it as a reference oscillation signal of PLL circuit 31 which controls the oscillating frequency of the local oscillator 26. In the 4th mixer 39 that carries out frequency conversion of the IF signal of a high-definition TV JON signal to baseband, a local oscillation signal with high frequency precision is needed. Therefore, the oscillating circuit where the frequency stability which used a crystal oscillator, a SAW resonator, etc. is high consists of the 4th local oscillator 40. For this reason, it changed to the reference oscillator contained in the 2nd working example of the above in PLL circuit 31, and with the counting-down circuit 42, dividing of the oscillation signal of the 4th local oscillator 40 was carried out, and it was used.
[0025]In this example, since in addition to the effect described in the 4th working example dividing of the oscillation signal of the 4th local oscillator 40 is carried out and it is used as a reference oscillation signal of PLL circuit 31 with the counting-down circuit 42, circuit structure reduction of the oscillator portion of a receiving set can be aimed at, and the highly precise recovery of a high-definition TV JON signal is possible.
[0026]Hereafter, based on the form of a high-definition TV JON signal, more concrete working example is described using Drawings.
[0027]The block diagram of the receiving set which drawing 6 shows the 6th working example of this invention, and drawing 7 are the signal band figures supplementary to the 6th working example. In drawing 6, the same number as drawing 5 is given to the portion which performs the same operation as working example shown in drawing 5, and explanation is abbreviated to it. As for the 5th IF amplifier and 63, in the figure, a low pass filter, and 66 and 67 are the amplifiers for baseband signals the 5th mixer, and 64 and 65 the 1st IF filter for high-definition TV JON signals in 60, the 2nd IF filter for high-definition TV JON signals in 61, and 62.
[0028]This example receives the high-definition TV JON signal which has a baseband signal zone shown in drawing 7, and an NTSC signal. The image and sound carrier (fv, fs), and chrominance subcarrier (fc) of the NTSC signal were shown in the frequency spectrum of the high-definition TV JON signal at drawing 7 for comparison. It is examined by the U.S. etc., for

example, the form of the high-definition TV JON signal compressed into a 6-MHz signal band is stated to the annual meeting etc. in detail in Fukui Mr. "trend in the West of advanced television method" pp.506-508, and Institute of Television Engineers of Japan 1992. In order to take into consideration the high-definition TV JON signal also when transmitted by the same channel as an NTSC signal, and to avoid the interference disturbance from an NTSC signal, Using the signal shown in drawing 7 which does not arrange the spectrum of a high-definition TV JON signal beforehand near [where the energy in an NTSC signal is high] an image and the sound carrier is proposed. Drawing 7 is signal forms which divide a signal with a high priority (H.P. section), and more than video carrier frequency into the other signal (SP section), and transmit below the video carrier frequency of an NTSC signal to the high-definition TV JON signal by which QAM was carried out. From the 2nd IF signal of the high-definition TV JON signal by which double frequency conversion was carried out, this example by the 1st IF filter 60 and 2nd IF filter 61 for high-definition TV JON signals that were constituted from an SAW filter. After separating this HP section and the SP section and amplifying with the 2nd IF amplifier 16 and 5th IF amplifier 62, frequency conversion is carried out to baseband with the 4th mixer 39 and the 5th mixer 63, respectively. After passing the low pass filters 64 and 65, with the amplifiers 66 and 67 for baseband signals, the HP section and the SP section which were changed into baseband are inputted into the demodulator 50 for high-definition TV JON signals as a desired signal level, respectively, and it restores to them. Although the 1st IF filter 60 and 2nd IF filter 61 for high-definition TV JON signals were constituted from an SAW filter separated, respectively, zone separation is possible for them also with the filter constituted on the same substrate.

[0029]In order to have the effect described in the 5th working example in this example, and to divide a zone and to perform signal processing after double frequency conversion to the high-definition TV JON signal of the signal band shown in drawing 7, It becomes possible to fully reduce the disturbance from the NTSC signal transmitted by interference between both zones, or the same channel.

[0030]Drawing 8 is a block diagram of the receiving set in which the 7th working example of this invention is shown. In the figure, the same number as drawing 6 is given to the portion which performs the same operation as working example shown in drawing 6, and explanation is abbreviated to it. In the figure, the 1st QAM wave detector and 71 70 The 2nd QAM wave detector, 72 and 73 -- as for the 5th oscillator and 77, the 1st career and a clock reproduction circuit, and 75 are [an AFC voltage generation circuit and 51] data demodulators the 6th oscillator and 78 the 2nd career and a clock reproduction circuit, and 76 a 90-degree phase converter and 74.

[0031]This example by the 1st IF filter 60 and 2nd IF filter 61 for high-definition TV JON signals that were constituted from an SAW filter from the 2nd IF signal of the high-definition TV JON signal by which double frequency conversion was carried out. After separating the HP section of the above-mentioned high-definition TV JON signal, and the SP section and amplifying with the 2nd IF amplifier 16 and 5th IF amplifier 62, each with the 1st and 2nd QAM wave detectors 70 and 71. Electricity is detected using two signals which carry out the phase shift of the oscillation signal of the 5th and 6th oscillators 76 and 77 with the phase converters 72 and 73 90 degrees, and have the phase contrast of 90 degrees mutually. Under the present circumstances, the oscillating frequency of the local oscillator 26 is controlled by the AFC voltage generation circuit 78, and frequency control is performed so that it may be in the best state about the 1st and 2nd careers, the career in the clock reproduction circuits 74 and 75, and

clock signal reproduction. The detected signal is inputted into the data demodulators 51, and it restores to it. Although the oscillating frequency of the local oscillator 26 was controlled here, the composition which controls the oscillating frequency of the 2nd local oscillator 28, and the composition which controls the oscillating frequency of the 5th and 6th oscillators 76 and 77 may be used.

[0032]In order to have the effect described in the 6th working example in this example and to perform QAM demodulation to the HP section of the high-definition TV JON signal of the signal band shown in drawing 7, and the SP section, respectively, Highly precise data demodulation becomes it is possible to reduce further the disturbance from the NTSC signal transmitted by interference between both zones or the same channel, and possible. Since the oscillating frequency of the local oscillator 26 is controlled and QAM demodulation is performed, the recovery of a highly precise high-definition TV JON signal is attained.

[0033]The block diagram of the receiving set which drawing 9 shows the 8th working example of this invention, and drawing 10 are the signal band figures supplementary to the 8th working example. In drawing 9, the same number as drawing 2 is given to the portion which performs the same operation as working example shown in drawing 2, and explanation is abbreviated to it. In the figure, 52 is a demodulator for high-definition TV JON signals.

[0034]This example receives the high-definition TV JON signal which has a baseband signal zone shown in drawing 10, and an NTSC signal. The image and sound carrier (fv, fs), and chrominance subcarrier (fc) of the NTSC signal were shown in the frequency spectrum of the high-definition TV JON signal like drawing 7 at drawing 10 for comparison. The figure is a signal band figure using the vestigial sideband amplitude modulation (VSB) of four values as other forms of the high-definition TV JON signal compressed into a 6-MHz signal band. This example carries out selection passage of the 2nd IF signal of the high-definition TV JON signal by which double frequency conversion was carried out by IF filter 15 for high-definition TV JON signals constituted from an SAW filter, After amplifying with 2nd IF amplifier 16, it inputs into the AM demodulation machine 34 like the IF signal of an NTSC signal, and gets over. When it restores to an NTSC signal, a demodulation signal is outputted from the AM demodulation machine 34, but when it restores to a high-definition TV JON signal, it inputs into the demodulator 52 for high-definition TV JON signals further, and it gets over. In order to reduce the disturbance from the NTSC signal transmitted by the same channel, into the AM demodulation machine 34, the notch filter from which the subcarrier of the above-mentioned NTSC signal which operates at the time of high-definition TV JON signal reception, and a subcarrier are removed is provided. Generating of disturbance is reduced, also when the band pass filter which has the bandwidth for one channel, follows the oscillating frequency of the local oscillator 26, and changes the center frequency of the pass band into the input filter 6 is provided and the disturbance signal of a strong electric field inputs compared with the input signal of choice.

[0035]Since AM also of the high-definition TV JON signal is carried out in this example in addition to the effect described in the 2nd working example, A part of recovery of a highly minute signal can be performed using the demodulator of an NTSC signal, and control of AGC voltage or AFC voltage can also be performed in common, the circuitry of a receiving set is simplified, and it becomes possible to reduce circuit structure. Although IF filter 15 for high-definition TV JON signals and IF filter 24 for NTSC signals were separately formed in this example, When the vestigial sideband width and roll-off characteristics of a high-definition TV JON signal and an NTSC signal are similar, both can be shared, and circuit structure is reduced

further.
[0036]The block diagram of the receiving set which drawing 11 shows the 9th working example of this invention, and drawing 12 are the signal band figures supplementary to the 9th working example. In the figure, the same number as drawing 2 and drawing 8 is given to the portion which performs the same operation as working example shown in drawing 2 and drawing 8, and explanation is abbreviated to it. In the figure, 53 is the data demodulators for high-definition TV JON signals.
[0037]This example receives the high-definition TV JON signal which has a baseband signal zone shown in drawing 12, and an NTSC signal. The image and sound carrier (fv, fs), and chrominance subcarrier (fc) of the NTSC signal were shown in the frequency spectrum of the high-definition TV JON signal like drawing 7 at drawing 12 for comparison. The figure is a signal band figure using the QAM abnormal conditions of sexadecimal of hexadecimal or 32 values as other forms of the high-definition TV JON signal compressed into a 6-MHz signal band. This example carries out selection passage of the 2nd IF signal of the high-definition TV JON signal by which double frequency conversion was carried out by IF filter 15 for high-definition TV JON signals constituted from an SAW filter, After amplifying with 2nd IF amplifier 16, electricity is detected using two signals which carry out the phase shift of the oscillation signal of the 5th oscillator 76 with the phase converter 72 90 degrees, and have the phase contrast of 90 degrees mutually with the 1st QAM wave detector 70. Under the present circumstances, the oscillating frequency of the local oscillator 26 is controlled by the AFC voltage generation circuit 78, and frequency control is performed so that it may be in the best state about the 1st and 2nd careers, the career in the clock reproduction circuits 74 and 75, and clock signal reproduction. The detected signal is inputted into the data demodulators 53, and it restores to it. Although the oscillating frequency of the local oscillator 26 was controlled here, the composition which controls the oscillating frequency of the 2nd local oscillator 28, and the composition which controls the oscillating frequency of the 5th oscillator 76 may be used. The notch filter is provided in order to reduce the disturbance from the NTSC signal transmitted by the same channel, and to remove the subcarrier of the above-mentioned NTSC signal, and a subcarrier to the QAM wave detector 70.
[0038]In this example, since in addition to the effect described in the 2nd working example the oscillating frequency of the local oscillator 26 is controlled and QAM demodulation is performed, the recovery of a highly precise high-definition TV JON signal is attained.
[0039]Although working example described until now inputs an NTSC signal and a high-definition TV JON signal from the signal input terminal 1 and is considering them as the composition distributed with the distributor 5, two input terminals are provided and the effect same also as composition of inputting into each signal processing part is acquired.
[0040]Although old working example mainly described use by TV and VTR apparatus as a receiving set which receives an NTSC signal and a high-definition TV JON signal, the same effect is acquired even if it applies said receiving set to telecommunications sectors, such as digital communication.
[0041]
[Effect of the Invention]According to this invention, the receiving set which can receive the high-definition TV JON signal which it is compressed into an NTSC signal and a 6-MHz zone, and is transmitted can be provided. By what a channel selection circuit, a local oscillator, and the 1st mixer are shared by the NTSC signal and a high-definition TV JON signal, and an IF filter and a demodulator are individually formed for in an NTSC signal and high-definition TV JON

signals. The receiving set which receives the NTSC signal which reduced circuit structure, and a high-definition TV JON signal can be constituted.

TECHNICAL FIELD

[Industrial Application]This invention is a receiving set which can receive a high-definition TV JON signal and the usual television signal, It is related with the receiving set which carries out common reception of the signal especially compressed into a 6-MHz zone as a high-definition TV JON signal, and the NTSC signal which has a 6-MHz zone as a usual television signal.

PRIOR ART

[Description of the Prior Art]the Television Sub-Division broadcasting formats (NTSC, PAL, etc.) from recent years and the former -- in addition, establishment of the high-definition TV JON broadcasting format is advanced in each country. In connection with this, the receiving set with little image quality and tone quality degradation at the time of high-definition TV JON signal reception has been needed also in a receiving set. The conventional single superheterodyne system Television Sub-Division receiving set is shown in drawing 13. In the figure, 1 a signal input terminal and 2 a channel select signal input terminal and 4 An image and a voice signal output terminal, 17 and 21 -- variable tuning circuits, and 18 and 20 -- variable attenuator and 19 -- an RF amplifier and 22 -- as for a local oscillator and 29, an IF amplifier and 24 are [a PLL (phase locked loop) circuit and 34] AM demodulation machines a frequency converter, and 23 and 25 a low pass filter and 31 an IF filter and 26. The NTSC signal is used and explained to the standard television signal as an example after this.
[0003]By the NTSC signal inputted from the signal input terminal 1, among the RF signals by which AM was carried out a desired signal, It passes selectively in the variable tuning circuits 17 and 21 which follow the oscillating frequency of the local oscillator 26 and change the center frequency of the pass band, it amplifies or decreases suitably with the variable attenuators 18 and 20 and RF amplifier 19 so that a desired signal may serve as a desired receiving level, and it is inputted into the frequency converter 22. It mixes with the local oscillation signal from the local oscillator 26 which forms feedback by PLL circuit 31 and the low pass filter 29 so that it may oscillate on the frequency corresponding to a desired channel with the channel select signal inputted from the channel select signal input terminal 2 in the frequency converter 22, The IF signal of 45 MHz bands is outputted. An IF signal is amplified with the 1st and 2 IF amplifiers 23 and 25, and only a desired zone is passed by IF filter 24 which comprises an SAW filter etc., it gets over with the AM demodulation machine 34, and the image and audio signal of baseband are outputted. AGC is performed using the inside and the variable attenuators 18 and 20 of the AM demodulation machine 34. AFC carries out fine control of the oscillating frequency of the local oscillator 26, and performs it.

EFFECT OF THE INVENTION

[Effect of the Invention]According to this invention, the receiving set which can receive the high-definition TV JON signal which it is compressed into an NTSC signal and a 6-MHz zone, and is transmitted can be provided. By what a channel selection circuit, a local oscillator, and the 1st mixer are shared by the NTSC signal and a high-definition TV JON signal, and an IF filter

and a demodulator are individually formed for in an NTSC signal and high-definition TV JON signals. The receiving set which receives the NTSC signal which reduced circuit structure, and a high-definition TV JON signal can be constituted.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention]However, the above-mentioned receiving set receives the usual television signals, such as NTSC, and reception of the high-definition TV JON signal is not taken into consideration. Receiving both usual television signals and high-definition TV JON signals is not taken into consideration, either.
[0005]Both the purposes of this invention can receive a usual television signal and high-definition TV JON signal. It is in providing the receiving set which can receive the NTSC signal which has a 6-MHz zone as a usual television signal especially, and the signal compressed into a 6-MHz zone as a high-definition TV JON signal.

MEANS

[Means for Solving the Problem]In order to attain the above-mentioned purpose, in this invention, a single superheterodyne system performs NTSC signal processing, By a TERODAIN method, consider high-definition TV JON signal processing as composition to perform to a double supermarket which has the 1st and 2nd mixer, and to it about the double superheterodyne system. Set the 1st IF signal frequency as 1 GHz or more, and a band pass filter which has display flatness within a zone which does not degrade a recovery of a high-definition TV JON signal in the 1st IF filter, and a low group delay deviation is used, An SAW filter for high-definition TV JON signals was provided as the 2nd IF filter, and a demodulator for highly minute signals was formed as a demodulation section.

OPERATION

[Function]In this invention, the receiving set which can receive an NTSC signal and a high-definition TV JON signal can be provided by the above-mentioned composition. By what a channel selection circuit, a local oscillator, and the 1st mixer are shared at the time of an NTSC signal and high-definition TV JON signal reception, and the 2nd IF filter or an IF filter, and a demodulator are individually formed for in an NTSC signal and high-definition TV JON signals. The receiving set which receives the NTSC signal which circuit structure reduced, and a high-definition TV JON signal can be constituted.

EXAMPLE

[Example]Hereafter, Drawings explain working example of this invention.
[0009]Drawing 1 is a block diagram of the receiving set in which the 1st working example of this invention is shown.
[0010]In the figure, 1 a signal input terminal and 2 a channel select signal input terminal and 3 A high-definition TV JON signal output terminal, 4 the image for NTSC and a voice signal output terminal, and 5 a distributor and 6 An input filter, Variable attenuator, and 8 and 19 7, 9, 18, and 20 The 1st and 2nd RF amplifier, 10 the 1st mixer and 11 the 1st IF filter and 12 The 1st IF

amplifier, 13 the 2nd mixer and 14 the 1st IF amplifier and 15 The IF filter for high-definition TV JON signals, 16 the 2nd IF amplifier, and 17 and 21 variable tuning circuits and 22 The 3rd mixer, 23 the 3rd IF amplifier and 24 the IF filter for NTSC signals, and 25 The 4th IF amplifier, 26 the 3rd local oscillator and 27 the 1st local oscillator and 28 The 2nd local oscillator, 29 and 30 -- as for the AM demodulation machine for NTSC signals, and 35, a PLL circuit and 33 are [a low pass filter and 37] AGC voltage amplifiers a low pass filter, and 31 and 32 the demodulator for high-definition TV JON signals, and 34 the signal level wave detector for high-definition TV JON signals, and 36. In the figure, the same number as drawing 13 is given to the portion which performs the same operation as Fig. 13, and explanation is abbreviated to it.
[0011]When an NTSC signal is inputted, since it is the same as signal processing described by the conventional example, explanation is omitted here. Input the RF signal of high-definition TV JON which has the 6-MHz zone which carried out the after [an A/D conversion] data compression of the RF signal by which AM was carried out by the NTSC signal, and the HARASHIN item of high-definition TV JON, and was modulated by QAM (orthogonal-axis amplitude modulation) etc. from the signal input terminal 1, and the distributor 5 distributes, The input filter 6 divides the RF signal of this high-definition TV JON into a VHF band and a UHF band (a VHF band may be further divided into low-pass, a mid-range, and a high region.), and the zone containing a desired channel is passed selectively. To the desired channel, it amplifies or decreases suitably with the variable attenuators 7 and 9 and RF amplifier 8 so that it may be set to a desired signal level, and it inputs into the 1st mixer 10. In the 1st mixer 10. It mixes with the local oscillation signal from PLL circuit 32 which built in the reference oscillator and the counting-down circuit so that it might oscillate on the frequency corresponding to a desired channel with the channel select signal inputted from the channel select signal input terminal 2, and the local oscillator 27 which forms feedback by the low pass filter 30, The 1st IF signal is outputted. The 1st IF signal frequency is set up more than the upper limited frequency of the ground transmission band of an NTSC television signal, or a CATV transmission band in order to reduce the intermodulation interference of an input signal, etc. The mutual interference disturbance by the 1st local oscillation signal, the 2nd local oscillation signal, and its higher harmonic signal is also taken into consideration, and it is 1 GHz or more and, specifically, sets to 1.2 GHz bands, 1.7 GHz bands, 2.6 GHz bands, 3 GHz bands, etc. The 1st IF signal set as these frequency bands is selectively passed by 1st IF filter 11. The recovery of a high-definition TV JON signal needs a recovery higher-precision than an NTSC signal. In order not to degrade the demodulation characteristic of a high-definition TV JON signal, the band pass filter which has the display flatness within a zone and a low group delay deviation is used for the 1st IF filter. After amplifying the 1st IF signal with 1st IF amplifier 12, it is inputted into the 2nd mixer 13. In the 2nd mixer, it mixes with the local oscillation signal from the 2nd local oscillator 28, and the 2nd IF signal is outputted. Let the 2nd IF signal frequency be the same 45 MHz bands as the time of the present NTSC signal reception. It inputs into IF filter 15 for high-definition TV JON signals which comprises an SAW filter etc., after amplifying the 2nd IF signal with 1st IF amplifier 14. Only the zone of the reception channel of choice is passed by an IF filter. In receiving a high-definition TV JON signal, the reception channel of choice is amplified with 2nd IF amplifier 16, and it inputs into the demodulator 33 for high-definition TV JON signals, and the recovery according to a modulation method is performed and it outputs the high-definition TV JON signal by which the data compression was carried out from the output terminal 3. The outputted signal is inputted into the digital signal processing circuit which performs data decompression, D/A conversion, etc., and outputs an image and a sound, or data to high-

definition TV JON. On the other hand, when receiving an NTSC signal, the reception channel of choice is amplified with 4th IF amplifier 25, and it inputs into the AM demodulation machine 34 for NTSC signals, and AM demodulation is carried out and the image and audio signal of baseband are outputted from the output terminal 4. AGC detects the signal which branched from the output of 2nd IF amplifier 16 with the signal level wave detector 35, when receiving a high-definition TV JON signal, with the low pass filter 36 and the AGC voltage amplifier 37, it generates AGC voltage, impresses it to the variable attenuators 7 and 9, and is performed. When receiving an NTSC signal, the part which ran short an inside and inside the AM demodulation machine 34 is performed using the variable attenuators 18 and 20. Using each AFC voltage from the demodulator 33 for high-definition TV JON signals, and the AM demodulation machine 34 for NTSC signals, AFC carries out fine control of the oscillating frequency of the 2nd local oscillator 28 and the 3rd local oscillator 26, and performs it. Although mentioned later, In order to take into consideration the high-definition TV JON signal also when transmitted by the same channel as an NTSC signal, and to avoid the interference disturbance from an NTSC signal, Near [where the energy in an NTSC signal is high] an image and a sound carrier, and the chrominance subcarrier, It is required for using the signal shown in drawing 7 which does not arrange the spectrum of a high-definition TV JON signal beforehand, or the demodulator 33 for high-definition TV JON signals to provide the notch filter from which the subcarrier of the above-mentioned NTSC signal and a subcarrier are removed etc.

[0012]As explained above, reception of an NTSC signal and a high-definition TV JON signal is not only possible, but the receiving set of this example can be restored to a high-definition TV JON signal with high precision.

[0013]Drawing 2 is a block diagram of the receiving set in which the 2nd working example of this invention is shown. In the figure, the same number as drawing 1 is given to the portion which performs the same operation as Fig. 1, and explanation is abbreviated to it.

[0014]This example takes reduction of circuit structure into consideration. Namely, in the 1st working example of the above, the 3rd local oscillator 26 and PLL circuit 31 are used for high-definition TV JON signals the 1st local oscillator 27, PLL circuit 32, and for NTSC signals, Control the local oscillation signal frequency which changes the reception channel of choice into the 1st IF signal or an IF signal, and at the time of high-definition TV JON signal reception. The fine adjustment using AFC voltage to the 2nd local oscillator 28 having performed in this example. The local oscillator 26 and PLL circuit 31 are shared, the fine adjustment using AFC voltage also switches the AFC voltage from the demodulator 33 for high-definition TV JON signals, and the AM demodulation machine 34 for NTSC signals according to an input signal in PLL circuit 31, and oscillated frequency control of the local oscillator 26 is performed.

[0015]In addition to the effect described in the 1st working example, by sharing a local oscillator and a PLL circuit by the high-definition TV JON signal processing part and an NTSC signal treating part, reduction of circuit structure can be aimed at and a simple channel selection means by which only the local oscillator 26 performs frequency control is obtained in this example.

[0016]Drawing 3 is a block diagram of the receiving set in which the 3rd working example of this invention is shown. In the figure, the same number as drawing 1 and drawing 2 is given to the portion which performs the same operation as Fig. 1 and Fig. 2, and explanation is abbreviated to it.

[0017]This example also takes reduction of circuit structure into consideration. Namely, in the 1st and 2nd working example of the above, use the 1st mixer 10 for high-definition TV JON signals, and the 3rd mixer 22 is used for NTSC signals, To having performed frequency

conversion which changes the reception channel of choice into the 1st IF signal or an IF signal, by this example, the mixer 10 is shared and frequency conversion is performed.
[0018]In addition to the effect described in the 1st and 2nd working example, in this example, reduction of circuit structure can be aimed at by sharing the mixer 10 by the high-definition TV JON signal processing part and an NTSC signal treating part.
[0019]Although not illustrated, the same effect as the above is acquired by sharing the 3rd either 1st IF amplifier 14 or IF amplifier 23 by the high-definition TV JON signal processing part and an NTSC signal treating part.
[0020]Drawing 4 is a block diagram of the receiving set in which the 4th working example of this invention is shown. In the figure, the same number as drawing 2 is given to the portion which performs the same operation as working example shown in drawing 2, and explanation is abbreviated to it. As for 39, in the figure, the 4th local oscillator and 50 are the demodulators for high-definition TV JON signals in baseband the 4th mixer and 40.
[0021]This example gets over to a high-definition TV JON signal by carrying out frequency conversion of the 2nd IF signal to baseband further. Namely, in the 2nd working example of the above, the 2nd IF signal of 45 MHz bands outputted from the 2nd mixer 13 is amplified with 1st and 2nd IF amplifier 14 and 16 to a high-definition TV JON signal, After making zone selection by IF filter 15 for high-definition TV JON signals, input into the demodulator 33 for high-definition TV JON signals, and the recovery according to a modulation method to having carried out in this example. It mixes with the 2nd IF signal and the local oscillation signal of 45 MHz bands from the 4th local oscillator 40 with the 4th mixer, and the high-definition TV JON signal of baseband is outputted. Selection passage of this signal is carried out by the low pass filter 41, and it gets over with the demodulator 50 for high-definition TV JON signals in baseband.
[0022]In this example, since it can restore to a high-definition TV JON signal by the baseband of a low frequency area in addition to the effect described in the 1st and 2nd working example, the composition of the demodulator for high-definition TV JON signals becomes easy.
[0023]Drawing 5 is a block diagram of the receiving set in which the 5th working example of this invention is shown. In the figure, the same number as drawing 4 is given to the portion which performs the same operation as working example shown in drawing 4, and explanation is abbreviated to it. In the figure, the PLL circuit where 31 does not contain a reference oscillator, and 42 are counting-down circuits.
[0024]This example carries out dividing of the oscillation signal of the 4th local oscillator 40, and it is used for it as a reference oscillation signal of PLL circuit 31 which controls the oscillating frequency of the local oscillator 26. In the 4th mixer 39 that carries out frequency conversion of the IF signal of a high-definition TV JON signal to baseband, a local oscillation signal with high frequency precision is needed. Therefore, the oscillating circuit where the frequency stability which used a crystal oscillator, a SAW resonator, etc. is high consists of the 4th local oscillator 40. For this reason, it changed to the reference oscillator contained in the 2nd working example of the above in PLL circuit 31, and with the counting-down circuit 42, dividing of the oscillation signal of the 4th local oscillator 40 was carried out, and it was used.
[0025]In this example, since in addition to the effect described in the 4th working example dividing of the oscillation signal of the 4th local oscillator 40 is carried out and it is used as a reference oscillation signal of PLL circuit 31 with the counting-down circuit 42, circuit structure reduction of the oscillator portion of a receiving set can be aimed at, and the highly precise recovery of a high-definition TV JON signal is possible.
[0026]Hereafter, based on the form of a high-definition TV JON signal, more concrete working

example is described using Drawings.
[0027]The block diagram of the receiving set which drawing 6 shows the 6th working example of this invention, and drawing 7 are the signal band figures supplementary to the 6th working example. In drawing 6, the same number as drawing 5 is given to the portion which performs the same operation as working example shown in drawing 5, and explanation is abbreviated to it. As for the 5th IF amplifier and 63, in the figure, a low pass filter, and 66 and 67 are the amplifiers for baseband signals the 5th mixer, and 64 and 65 the 1st IF filter for high-definition TV JON signals in 60, the 2nd IF filter for high-definition TV JON signals in 61, and 62.
[0028]This example receives the high-definition TV JON signal which has a baseband signal zone shown in drawing 7, and an NTSC signal. The image and sound carrier (fv, fs), and chrominance subcarrier (fc) of the NTSC signal were shown in the frequency spectrum of the high-definition TV JON signal at drawing 7 for comparison. It is examined by the U.S. etc., for example, the form of the high-definition TV JON signal compressed into a 6-MHz signal band is stated to the annual meeting etc. in detail in Fukui Mr. "trend in the West of advanced television method" pp.506-508, and Institute of Television Engineers of Japan 1992. In order to take into consideration the high-definition TV JON signal also when transmitted by the same channel as an NTSC signal, and to avoid the interference disturbance from an NTSC signal, Using the signal shown in drawing 7 which does not arrange the spectrum of a high-definition TV JON signal beforehand near [where the energy in an NTSC signal is high] an image and the sound carrier is proposed. Drawing 7 is signal forms which divide a signal with a high priority (H.P. section), and more than video carrier frequency into the other signal (SP section), and transmit below the video carrier frequency of an NTSC signal to the high-definition TV JON signal by which QAM was carried out. From the 2nd IF signal of the high-definition TV JON signal by which double frequency conversion was carried out, this example by the 1st IF filter 60 and 2nd IF filter 61 for high-definition TV JON signals that were constituted from an SAW filter. After separating this HP section and the SP section and amplifying with the 2nd IF amplifier 16 and 5th IF amplifier 62, frequency conversion is carried out to baseband with the 4th mixer 39 and the 5th mixer 63, respectively. After passing the low pass filters 64 and 65, with the amplifiers 66 and 67 for baseband signals, the HP section and the SP section which were changed into baseband are inputted into the demodulator 50 for high-definition TV JON signals as a desired signal level, respectively, and it restores to them. Although the 1st IF filter 60 and 2nd IF filter 61 for high-definition TV JON signals were constituted from an SAW filter separated, respectively, zone separation is possible for them also with the filter constituted on the same substrate.
[0029]In order to have the effect described in the 5th working example in this example, and to divide a zone and to perform signal processing after double frequency conversion to the high-definition TV JON signal of the signal band shown in drawing 7, It becomes possible to fully reduce the disturbance from the NTSC signal transmitted by interference between both zones, or the same channel.
[0030]Drawing 8 is a block diagram of the receiving set in which the 7th working example of this invention is shown. In the figure, the same number as drawing 6 is given to the portion which performs the same operation as working example shown in drawing 6, and explanation is abbreviated to it. In the figure, the 1st QAM wave detector and 71 70 The 2nd QAM wave detector, 72 and 73 -- as for the 5th oscillator and 77, the 1st career and a clock reproduction circuit, and 75 are [an AFC voltage generation circuit and 51] data demodulators the 6th oscillator and 78 the 2nd career and a clock reproduction circuit, and 76 a 90-degree phase

converter and 74.
[0031]This example by the 1st IF filter 60 and 2nd IF filter 61 for high-definition TV JON signals that were constituted from an SAW filter from the 2nd IF signal of the high-definition TV JON signal by which double frequency conversion was carried out. After separating the HP section of the above-mentioned high-definition TV JON signal, and the SP section and amplifying with the 2nd IF amplifier 16 and 5th IF amplifier 62, each with the 1st and 2nd QAM wave detectors 70 and 71. Electricity is detected using two signals which carry out the phase shift of the oscillation signal of the 5th and 6th oscillators 76 and 77 with the phase converters 72 and 73 90 degrees, and have the phase contrast of 90 degrees mutually. Under the present circumstances, the oscillating frequency of the local oscillator 26 is controlled by the AFC voltage generation circuit 78, and frequency control is performed so that it may be in the best state about the 1st and 2nd careers, the career in the clock reproduction circuits 74 and 75, and clock signal reproduction. The detected signal is inputted into the data demodulators 51, and it restores to it. Although the oscillating frequency of the local oscillator 26 was controlled here, the composition which controls the oscillating frequency of the 2nd local oscillator 28, and the composition which controls the oscillating frequency of the 5th and 6th oscillators 76 and 77 may be used.
[0032]In order to have the effect described in the 6th working example in this example and to perform QAM demodulation to the HP section of the high-definition TV JON signal of the signal band shown in drawing 7, and the SP section, respectively, Highly precise data demodulation becomes it is possible to reduce further the disturbance from the NTSC signal transmitted by interference between both zones or the same channel, and possible. Since the oscillating frequency of the local oscillator 26 is controlled and QAM demodulation is performed, the recovery of a highly precise high-definition TV JON signal is attained.
[0033]The block diagram of the receiving set which drawing 9 shows the 8th working example of this invention, and drawing 10 are the signal band figures supplementary to the 8th working example. In drawing 9, the same number as drawing 2 is given to the portion which performs the same operation as working example shown in drawing 2, and explanation is abbreviated to it. In the figure, 52 is a demodulator for high-definition TV JON signals.
[0034]This example receives the high-definition TV JON signal which has a baseband signal zone shown in drawing 10, and an NTSC signal. The image and sound carrier (fv, fs), and chrominance subcarrier (fc) of the NTSC signal were shown in the frequency spectrum of the high-definition TV JON signal like drawing 7 at drawing 10 for comparison. The figure is a signal band figure using the vestigial sideband amplitude modulation (VSB) of four values as other forms of the high-definition TV JON signal compressed into a 6-MHz signal band. This example carries out selection passage of the 2nd IF signal of the high-definition TV JON signal by which double frequency conversion was carried out by IF filter 15 for high-definition TV JON signals constituted from an SAW filter, After amplifying with 2nd IF amplifier 16, it inputs into the AM demodulation machine 34 like the IF signal of an NTSC signal, and gets over. When it restores to an NTSC signal, a demodulation signal is outputted from the AM demodulation machine 34, but when it restores to a high-definition TV JON signal, it inputs into the demodulator 52 for high-definition TV JON signals further, and it gets over. In order to reduce the disturbance from the NTSC signal transmitted by the same channel, into the AM demodulation machine 34, the notch filter from which the subcarrier of the above-mentioned NTSC signal which operates at the time of high-definition TV JON signal reception, and a subcarrier are removed is provided. Generating of disturbance is reduced, also when the band

pass filter which has the bandwidth for one channel, follows the oscillating frequency of the local oscillator 26, and changes the center frequency of the pass band into the input filter 6 is provided and the disturbance signal of a strong electric field inputs compared with the input signal of choice.

[0035]Since AM also of the high-definition TV JON signal is carried out in this example in addition to the effect described in the 2nd working example, A part of recovery of a highly minute signal can be performed using the demodulator of an NTSC signal, and control of AGC voltage or AFC voltage can also be performed in common, the circuitry of a receiving set is simplified, and it becomes possible to reduce circuit structure. Although IF filter 15 for high-definition TV JON signals and IF filter 24 for NTSC signals were separately formed in this example, When the vestigial sideband width and roll-off characteristics of a high-definition TV JON signal and an NTSC signal are similar, both can be shared, and circuit structure is reduced further.

[0036]The block diagram of the receiving set which drawing 11 shows the 9th working example of this invention, and drawing 12 are the signal band figures supplementary to the 9th working example. In the figure, the same number as drawing 2 and drawing 8 is given to the portion which performs the same operation as working example shown in drawing 2 and drawing 8, and explanation is abbreviated to it. In the figure, 53 is the data demodulators for high-definition TV JON signals.

[0037]This example receives the high-definition TV JON signal which has a baseband signal zone shown in drawing 12, and an NTSC signal. The image and sound carrier (fv, fs), and chrominance subcarrier (fc) of the NTSC signal were shown in the frequency spectrum of the high-definition TV JON signal like drawing 7 at drawing 12 for comparison. The figure is a signal band figure using the QAM abnormal conditions of sexadecimal of hexadecimal or 32 values as other forms of the high-definition TV JON signal compressed into a 6-MHz signal band. This example carries out selection passage of the 2nd IF signal of the high-definition TV JON signal by which double frequency conversion was carried out by IF filter 15 for high-definition TV JON signals constituted from an SAW filter, After amplifying with 2nd IF amplifier 16, electricity is detected using two signals which carry out the phase shift of the oscillation signal of the 5th oscillator 76 with the phase converter 72 90 degrees, and have the phase contrast of 90 degrees mutually with the 1st QAM wave detector 70. Under the present circumstances, the oscillating frequency of the local oscillator 26 is controlled by the AFC voltage generation circuit 78, and frequency control is performed so that it may be in the best state about the 1st and 2nd careers, the career in the clock reproduction circuits 74 and 75, and clock signal reproduction. The detected signal is inputted into the data demodulators 53, and it restores to it. Although the oscillating frequency of the local oscillator 26 was controlled here, the composition which controls the oscillating frequency of the 2nd local oscillator 28, and the composition which controls the oscillating frequency of the 5th oscillator 76 may be used. The notch filter is provided in order to reduce the disturbance from the NTSC signal transmitted by the same channel, and to remove the subcarrier of the above-mentioned NTSC signal, and a subcarrier to the QAM wave detector 70.

[0038]In this example, since in addition to the effect described in the 2nd working example the oscillating frequency of the local oscillator 26 is controlled and QAM demodulation is performed, the recovery of a highly precise high-definition TV JON signal is attained.

[0039]Although working example described until now inputs an NTSC signal and a high-definition TV JON signal from the signal input terminal 1 and is considering them as the

composition distributed with the distributor 5, two input terminals are provided and the effect same also as composition of inputting into each signal processing part is acquired.
[0040]Although old working example mainly described use by TV and VTR apparatus as a receiving set which receives an NTSC signal and a high-definition TV JON signal, the same effect is acquired even if it applies said receiving set to telecommunications sectors, such as digital communication.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1]It is a block diagram showing the 1st working example of this invention.
[Drawing 2]It is a block diagram showing the 2nd working example.
[Drawing 3]It is a block diagram showing the 3rd working example.
[Drawing 4]It is a block diagram showing the 4th working example.
[Drawing 5]It is a block diagram showing the 5th working example.
[Drawing 6]It is a block diagram showing the 6th working example.
[Drawing 7]It is a signal band figure supplementary to the 6th working example.
[Drawing 8]It is a block diagram showing the 7th working example.
[Drawing 9]It is a block diagram showing the 8th working example.
[Drawing 10]It is a signal band figure supplementary to the 8th working example.
[Drawing 11]It is a block diagram showing the 9th working example.
[Drawing 12]It is a signal band figure supplementary to the 9th working example.
[Drawing 13]It is a block diagram showing a conventional example.
[Description of Notations]
1 -- Signal input terminal,
2 -- Channel select signal input terminal,
3 -- High-definition TV JON signal output terminal,
4 -- NTSC signal output terminal,
5 -- Distributor,
7, 9, 18, 20 -- Variable attenuator,
8, 19 -- The 1st and 2nd RF amplifier,
10 -- The 1st mixer,
11 -- The 1st IF filter,
12 -- The 1st IF amplifier,
13 -- The 2nd mixer,
14 -- The 1st IF amplifier,
15, 60, 61 -- IF filter for high-definition TV JON signals,
16 -- The 2nd IF amplifier,
17, 21 -- Variable tuning circuits,
22 -- The 3rd mixer,
23 -- The 3rd IF amplifier,
24 -- IF filter for NTSC signals,
25 -- The 4th IF amplifier,
26 -- The 3rd local oscillator,
27 -- The 1st local oscillator for high-definition TV JON signals,
28 -- The 2nd local oscillator,

29, 30, 36, 41, 64, 65, -- low pass filter,
31, 32 -- PLL circuit
33, 50, 51, 52, 53 -- Demodulator for high-definition TV JON signals,
34 -- Demodulator for NTSC signals,
35 -- Level detector for high-definition TV JON signals,
37 -- AGC voltage amplifier,
39 -- The 4th mixer,
40 -- The 4th local oscillator,
42 -- Counting-down circuit,
62 -- The 5th IF amplifier,
63 -- The 5th mixer,
66, 67 -- Amplifier for baseband signals,
70, 71 -- QAM wave detector,
72, a 73--90-degree phase converter,
74, 75 -- A career and clock reproduction circuit,
76, 77 -- Reference oscillator,
78 -- AFC voltage generator.

[Translation done.]

(19)日本国特許庁（ＪＰ）　(12) **公開特許公報（Ａ）**　(11)特許出願公開番号

特開平6－133274

(43)公開日　平成６年(1994)５月13日

(51)Int.Cl.[5]	識別記号	庁内整理番号	Ｆ Ｉ	技術表示箇所
Ｈ０４Ｎ　7/00		Ａ　9187－5Ｃ		
5/46				

審査請求　未請求　請求項の数６(全 15 頁)

(21)出願番号　特願平4－276977

(22)出願日　平成４年(1992)10月15日

(71)出願人　000005108
株式会社日立製作所
東京都千代田区神田駿河台四丁目６番地
(72)発明者　池戸　浩靖
神奈川県横浜市戸塚区吉田町292番地株式会社日立製作所映像メディア研究所内
(72)発明者　水上　博之
神奈川県横浜市戸塚区吉田町292番地株式会社日立製作所映像メディア研究所内
(72)発明者　長嶋　敏夫
神奈川県横浜市戸塚区吉田町292番地株式会社日立製作所映像メディア研究所内
(74)代理人　弁理士　小川　勝男

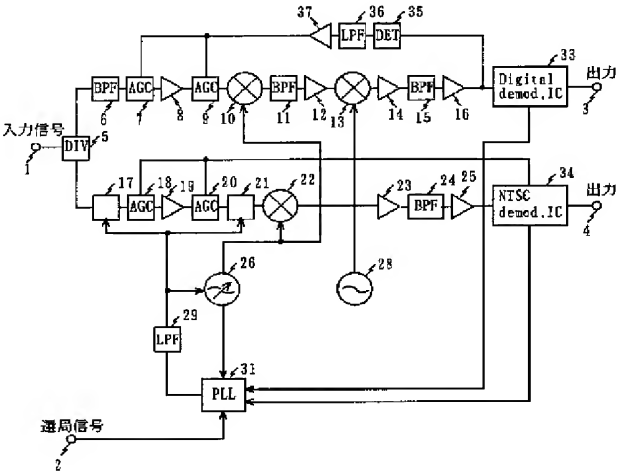
(54)【発明の名称】　受信装置

(57)【要約】　（修正有）

【目的】高精細テレビジョン信号と通常のテレビジョン信号を受信することが可能な受信装置で、特に、高精細テレビジョン信号として６ＭＨｚの帯域に圧縮された信号と、通常のテレビジョン信号として６ＭＨｚの帯域を有するＮＴＳＣ信号を共用受信する受信装置を提供することにある。

【構成】シングルスーパーヘテロダイン方式のＮＴＳＣ信号処理部２４，３４とダブルスーパーヘテロダイン方式の高精細テレビジョン信号処理部を設け、高精細テレビジョン信号処理部の第１ＩＦ信号周波数を１ＧＨｚ以上に設定し、第１ＩＦフィルタ１５に高精細テレビジョン信号の復調を劣化させない帯域内平坦度と低群遅延偏差を有するバンドパスフィルタを用い、第２ＩＦフィルタとして高精細テレビジョン信号用ＳＡＷフィルタを設け、復調部として高精細信号用復調器３３を設けた。

図 2



【特許請求の範囲】
【請求項１】標準ＴＶ信号（ＮＴＳＣ、ＰＡＬ、ＳＥＣＡＭなど）により変調されたＲＦ信号と、高精細テレビジョン信号により変調されたＲＦ信号が入力され、それぞれの信号を復調して出力する受信装置において、該ＡＭ変調された高精細テレビジョン信号を処理する高精細テレビジョン信号処理部を、少なくとも、選局情報によりＰＬＬ回路を用いて発振周波数制御を行う第１の局部発振器と、希望信号を第１ＩＦ信号に変換する第１の周波数変換器と、第２の局部発振器と、第２ＩＦ信号に変換する第２の周波数変換器と、第２ＩＦ信号を入力し復調する復調器とから構成されるダブルスーパーヘテロダイン方式とし、該ＡＭ変調された標準ＴＶ信号を処理する標準ＴＶ信号処理部を、少なくとも、選局情報によりＰＬＬ回路を用いて発振周波数制御を行う局部発振器と、希望信号をＩＦ信号に変換する周波数変換器と、ＩＦ信号を入力し復調する復調器とから構成されるシングルスーパーヘテロダイン方式で構成したことを特徴とする受信装置。
【請求項２】請求項１に記載の受信装置において、前記高精細テレビジョン信号処理部のＡＧＣ電圧を、高精細テレビジョン信号の第２ＩＦ信号を検波する検波器と、該検波出力を通過させるローパスフィルタと、該ローパスフィルタの出力を所望の電圧値に増幅する増幅器により生成することを特徴とする受信装置。
【請求項３】請求項１又は請求項２に記載の受信装置において、前記高精細テレビジョン信号処理部に含まれる、ＰＬＬ回路を用いて発振周波数制御を行う第１の局部発振器、あるいは前記標準ＴＶ信号処理部に含まれる、ＰＬＬ回路を用いて発振周波数制御を行う局部発振器のいずれかのＰＬＬ回路と局部発振器を共用し、また高精細テレビジョン用復調器から出力される高精細テレビジョン信号用ＡＦＣ電圧と標準ＴＶ信号用復調器から出力される標準ＴＶ信号用ＡＦＣ電圧を前記ＰＬＬ回路で切り換えて周波数制御に用いる構成としたことを特徴とする受信装置。
【請求項４】請求項３に記載の受信装置において、前記高精細テレビジョン信号処理部に含まれる、希望信号を第１ＩＦ信号に変換する第１の周波数変換器、あるいは前記標準ＴＶ信号処理部に含まれる、希望信号をＩＦ信号に変換する周波数変換器のいずれかの周波数変換器を共用したことを特徴とする受信装置。
【請求項５】請求項１又は請求項２又は請求項３又は請求項４に記載の受信装置において、前記高精細テレビジョン信号処理部に、第３の局部発振器と、該第３の局部発振器から出力される局部発振信号と前記第２ＩＦ信号を入力しベースバンド信号に変換する第３の周波数変換器と、該ベースバンドの高精細テレビジョン信号用復調器とを設けたことを特徴とする受信装置。
【請求項６】請求項５に記載の受信装置において、第３の局部発振器を水晶振動子を用いた発振回路で構成し、該第３の局部発振器から出力される局部発振信号を分周して出力する分周器を設け、該分周信号をＰＬＬ回路の基準信号として用いることを特徴とする受信装置。
【発明の詳細な説明】
【０００１】
【産業上の利用分野】本発明は、高精細テレビジョン信号と通常のテレビジョン信号を受信することが可能な受信装置で、特に、高精細テレビジョン信号として６ＭＨｚの帯域に圧縮された信号と、通常のテレビジョン信号として６ＭＨｚの帯域を有するＮＴＳＣ信号を共用受信する受信装置に関する。
【０００２】
【従来の技術】近年、従来からのテレビジョン放送方式（ＮＴＳＣ、ＰＡＬ等）に加えて、高精細テレビジョン放送方式の確立が各国で進められている。これに伴い、受信装置においても、高精細テレビジョン信号受信時の画質・音質劣化が少ない受信装置が必要になってきた。図１３に従来のシングルスーパーヘテロダイン方式テレビジョン受信装置を示す。同図において、１は信号入力端子、２は選局信号入力端子、４は映像及び音声信号出力端子、１７、２１は可変同調回路、１８、２０は可変減衰器、１９はＲＦ増幅器、２２は周波数変換器、２３、２５はＩＦ増幅器、２４はＩＦフィルタ、２６は局部発振器、２９はローパスフィルタ、３１はＰＬＬ（フェーズロックループ）回路、３４はＡＭ復調器である。また、これ以降は、例として標準ＴＶ信号にＮＴＳＣ信号を用いて説明していく。
【０００３】信号入力端子１から入力されるＮＴＳＣ信号でＡＭ変調されたＲＦ信号のうち希望信号は、局部発振器２６の発振周波数に追従してその通過帯域の中心周波数を可変する可変同調回路１７、２１で選択的に通過され、希望信号が所望の受信レベルとなるよう可変減衰器１８、２０及びＲＦ増幅器１９で適宜増幅あるいは減衰され、周波数変換器２２に入力される。周波数変換器２２では、選局信号入力端子２から入力される選局信号により希望チャネルに対応した周波数で発振を行うようＰＬＬ回路３１、ローパスフィルタ２９でフィードバックを形成してなる局部発振器２６からの局部発振信号と混合し、４５ＭＨｚ帯のＩＦ信号を出力する。ＩＦ信号は第１、２のＩＦ増幅器２３、２５で増幅されると共に、ＳＡＷフィルタ等で構成されるＩＦフィルタ２４で所望の帯域のみが通過され、ＡＭ復調器３４で復調され、ベースバンドの映像及び音声信号が出力される。ＡＧＣはＡＭ復調器３４の内部と可変減衰器１８、２０を用いて行う。また、ＡＦＣは局部発振器２６の発振周波数を微調して行う。
【０００４】
【発明が解決しようとする課題】しかしながら、上記の受信装置は、ＮＴＳＣ等通常のテレビジョン信号を受信

するものであり、高精細テレビジョン信号の受信は考慮されていない。また、通常のテレビジョン信号と高精細テレビジョン信号を共に受信することも考慮されていない。

【０００５】本発明の目的は、通常のテレビジョン信号と高精細テレビジョン信号を共に受信することが可能で、特に、通常のテレビジョン信号として６ＭＨｚの帯域を有するＮＴＳＣ信号と、高精細テレビジョン信号として６ＭＨｚの帯域に圧縮された信号を受信可能な受信装置を提供することにある。

【０００６】

【課題を解決するための手段】上記した目的を達成するため、本発明では、ＮＴＳＣ信号処理をシングルスーパーヘテロダイン方式で行い、高精細テレビジョン信号処理を第１、第２のミクサを有するダブルスーパーヘテロダイン方式で行う構成とし、そのダブルスーパーヘテロダイン方式については、第１ＩＦ信号周波数を１ＧＨｚ以上に設定し、第１ＩＦフィルタに高精細テレビジョン信号の復調を劣化させない帯域内平坦度と低群遅延偏差を有するバンドパスフィルタを用い、第２ＩＦフィルタとして高精細テレビジョン信号用ＳＡＷフィルタを設け、復調部として高精細信号用復調器を設けた。

【０００７】

【作用】本発明では、上記構成により、ＮＴＳＣ信号と高精細テレビジョン信号を受信可能な受信装置を提供できる。また、選局回路、局部発振器、第１ミクサをＮＴＳＣ信号と高精細テレビジョン信号受信時に共用し、第２ＩＦフィルタあるいはＩＦフィルタと復調器をＮＴＳＣ信号と高精細テレビジョン信号用に個別に設けることで、回路規模の低減したＮＴＳＣ信号、高精細テレビジョン信号を受信する受信装置が構成できる。

【０００８】

【実施例】以下、本発明の実施例を図面により説明する。

【０００９】図１は、本発明の第１の実施例を示す受信装置のブロック図である。

【００１０】同図において、１は信号入力端子、２は選局信号入力端子、３は高精細テレビジョン信号出力端子、４はＮＴＳＣ用映像及び音声信号出力端子、５は分配器、６は入力フィルタ、７、９、１８、２０は可変減衰器、８、１９は第１、第２のＲＦ増幅器、１０は第１ミクサ、１１は第１ＩＦフィルタ、１２は第１ＩＦ増幅器、１３は第２ミクサ、１４は第１のＩＦ増幅器、１５は高精細テレビジョン信号用ＩＦフィルタ、１６は第２のＩＦ増幅器、１７、２１は可変同調回路、２２は第３ミクサ、２３は第３のＩＦ増幅器、２４はＮＴＳＣ信号用ＩＦフィルタ、２５は第４のＩＦ増幅器、２６は第３の局部発振器、２７は第１の局部発振器、２８は第２の局部発振器、２９、３０はローパスフィルタ、３１、３２はＰＬＬ回路、３３は高精細テレビジョン信号用復調器、３４はＮＴＳＣ信号用ＡＭ復調器、３５は高精細テレビジョン信号用信号レベル検波器、３６はローパスフィルタ、３７はＡＧＣ電圧増幅器である。同図において、第１３図と同様の動作を行う部分には、図１３と同一の番号を付し説明を略す。

【００１１】ＮＴＳＣ信号が入力された場合には、従来例で述べた信号処理と同じなのでここでは説明を省略する。信号入力端子１から、ＮＴＳＣ信号でＡＭ変調されたＲＦ信号と、高精細テレビジョンの原信号をＡ／Ｄ変換後データ圧縮しＱＡＭ（直交軸振幅変調）等で変調された６ＭＨｚの帯域を有する高精細テレビジョンのＲＦ信号を入力し、分配器５で分配し、該高精細テレビジョンのＲＦ信号については入力フィルタ６でＶＨＦ帯、ＵＨＦ帯（さらには、ＶＨＦ帯を低域、中域、高域に分割する場合もある。）に分割し、希望チャネルを含む帯域を選択的に通過させる。その希望チャネルに対し、所望の信号レベルとなるよう可変減衰器７、９及びＲＦ増幅器８で適宜増幅あるいは減衰し、第１ミクサ１０へ入力する。第１ミクサ１０では、選局信号入力端子２から入力される選局信号により希望チャネルに対応した周波数で発振を行うよう基準発振器や分周器を内蔵したＰＬＬ回路３２、ローパスフィルタ３０でフィードバックを形成してなる局部発振器２７からの局部発振信号と混合し、第１ＩＦ信号を出力する。第１ＩＦ信号周波数は受信信号の相互変調妨害などを低減するため、ＮＴＳＣテレビジョン信号の地上伝送帯域やＣＡＴＶ伝送帯域の上限周波数以上に設定する。具体的には、第１局部発振信号や第２局部発振信号及びその高調波信号による相互干渉妨害も考慮して、１ＧＨｚ以上で、１．２ＧＨｚ帯、１．７ＧＨｚ帯、２．６ＧＨｚ帯、３ＧＨｚ帯等に設定する。これらの周波数帯に設定された第１ＩＦ信号を第１ＩＦフィルタ１１で選択的に通過させる。高精細テレビジョン信号の復調はＮＴＳＣ信号より精度の高い復調を必要とする。高精細テレビジョン信号の復調特性を劣化させないため、第１ＩＦフィルタには帯域内平坦度と低群遅延偏差を有するバンドパスフィルタを用いる。第１ＩＦ信号は第１ＩＦ増幅器１２で増幅した後第２ミクサ１３に入力する。第２ミクサでは第２の局部発振器２８からの局部発振信号と混合し、第２ＩＦ信号を出力する。第２ＩＦ信号周波数は現行ＮＴＳＣ信号受信時と同じ４５ＭＨｚ帯とする。第２ＩＦ信号を第１のＩＦ増幅器１４で増幅した後、ＳＡＷフィルタ等で構成される高精細テレビジョン信号用ＩＦフィルタ１５に入力する。ＩＦフィルタで希望受信チャネルの帯域のみを通過させる。高精細テレビジョン信号を受信する場合には、第２のＩＦ増幅器１６で希望受信チャネルを増幅し高精細テレビジョン信号用復調器３３に入力し、変調方式に応じた復調を行い、データ圧縮された高精細テレビジョン信号を出力端子３から出力する。出力された信号はデータ伸長やＤ／Ａ変換などを行うデジタル信号処理回路へ入

力され、高精細テレビジョンに映像及び音声あるいはデータを出力する。一方、ＮＴＳＣ信号を受信する場合には、第４のＩＦ増幅器２５で希望受信チャネルを増幅しＮＴＳＣ信号用ＡＭ復調器３４に入力し、ＡＭ復調され、ベースバンドの映像及び音声信号が出力端子４から出力される。ＡＧＣは、高精細テレビジョン信号を受信する場合は第２のＩＦ増幅器１６の出力から分岐した信号を信号レベル検波器３５で検波し、ローパスフィルタ３６、ＡＧＣ電圧増幅器３７によってＡＧＣ電圧を生成し、可変減衰器７、９に印加して行う。またＮＴＳＣ信号を受信する場合はＡＭ復調器３４の内部と内部で不足した分を可変減衰器１８、２０を用いて行う。また、ＡＦＣは高精細テレビジョン信号用復調器３３、ＮＴＳＣ信号用ＡＭ復調器３４からのそれぞれのＡＦＣ電圧を用い、第２の局部発振器２８、第３の局部発振器２６の発振周波数を微調して行う。なお、後述するが、高精細テレビジョン信号はＮＴＳＣ信号と同一のチャネルで伝送される場合も考慮されており、ＮＴＳＣ信号からの干渉妨害を避けるため、ＮＴＳＣ信号中エネルギーの高い映像及び音声搬送波と色副搬送波の近傍には、予め高精細テレビジョン信号のスペクトルを配置しない図７に示した信号を用いることや高精細テレビジョン信号用復調器３３に上記ＮＴＳＣ信号の搬送波、副搬送波を除去するノッチフィルタを設けることなどが必要である。

【００１２】以上説明したように、本実施例の受信装置は、ＮＴＳＣ信号と高精細テレビジョン信号の受信が可能であるだけでなく、高精細テレビジョン信号を高精度に復調することが可能である。

【００１３】図２は、本発明の第２の実施例を示す受信装置のブロック図である。同図において、第１図と同様の動作を行う部分には、図１と同一の番号を付し説明を略す。

【００１４】本実施例は回路規模の低減を考慮したものである。即ち、上記第１の実施例では高精細テレビジョン信号用に第１の局部発振器２７とＰＬＬ回路３２、ＮＴＳＣ信号用に第３の局部発振器２６とＰＬＬ回路３１を用いて、希望受信チャネルを第１ＩＦ信号あるいはＩＦ信号に変換する局部発振信号周波数の制御を行い、高精細テレビジョン信号受信時には、ＡＦＣ電圧を用いた微調整を第２の局部発振器２８で行っていたのに対し、本実施例では、局部発振器２６とＰＬＬ回路３１を共用し、ＡＦＣ電圧を用いた微調整もＰＬＬ回路３１内で高精細テレビジョン信号用復調器３３、ＮＴＳＣ信号用ＡＭ復調器３４からのＡＦＣ電圧を受信信号に応じて切換えて局部発振器２６の発振周波数制御を行っている。

【００１５】本実施例では、第１の実施例で述べた効果に加え、高精細テレビジョン信号処理部とＮＴＳＣ信号処理部で局部発振器とＰＬＬ回路を共用することにより、回路規模の低減が図れ、周波数制御を局部発振器２６だけで行う簡便な選局手段が得られる。

【００１６】図３は、本発明の第３の実施例を示す受信装置のブロック図である。同図において、第１図、第２図と同様の動作を行う部分には、図１、図２と同一の番号を付し説明を略す。

【００１７】本実施例も回路規模の低減を考慮したものである。即ち、上記第１、第２の実施例では高精細テレビジョン信号用に第１ミクサ１０、ＮＴＳＣ信号用に第３ミクサ２２を用いて、希望受信チャネルを第１ＩＦ信号あるいはＩＦ信号に変換する周波数変換を行っていたのに対し、本実施例では、ミクサ１０を共用し周波数変換を行っている。

【００１８】本実施例では、第１、第２の実施例で述べた効果に加え、高精細テレビジョン信号処理部とＮＴＳＣ信号処理部でミクサ１０を共用することにより、回路規模の低減が図れる。

【００１９】また、図示していないが、第１のＩＦ増幅器１４と第３のＩＦ増幅器２３のいずれかを高精細テレビジョン信号処理部とＮＴＳＣ信号処理部で共用することにより、上記と同様な効果が得られる。

【００２０】図４は本発明の第４の実施例を示す受信装置のブロック図である。同図において、図２に示した実施例と同様の動作を行う部分には、図２と同一の番号を付し説明を略す。同図において、３９は第４ミクサ、４０は第４の局部発振器、５０はベースバンドでの高精細テレビジョン信号用復調器である。

【００２１】本実施例は高精細テレビジョン信号に対し、第２ＩＦ信号をさらにベースバンドへ周波数変換し復調を行うことを特徴とする。即ち、上記第２の実施例では高精細テレビジョン信号に対し、第２ミクサ１３から出力した４５ＭＨｚ帯の第２ＩＦ信号を第１、第２のＩＦ増幅器１４、１６で増幅し、高精細テレビジョン信号用ＩＦフィルタ１５で帯域選択した後、高精細テレビジョン信号用復調器３３に入力し、変調方式に応じた復調を行っていたのに対し、本実施例では、第４ミクサで第２ＩＦ信号と第４の局部発振器４０からの４５ＭＨｚ帯の局部発振信号と混合し、ベースバンドの高精細テレビジョン信号を出力する。この信号をローパスフィルタ４１で選択通過させ、ベースバンドでの高精細テレビジョン信号用復調器５０で復調を行う。

【００２２】本実施例では、第１、第２の実施例で述べた効果に加え、高精細テレビジョン信号の復調を低周波域のベースバンドで行えるため、高精細テレビジョン信号用復調器の構成が簡単になる。

【００２３】図５は本発明の第５の実施例を示す受信装置のブロック図である。同図において、図４に示した実施例と同様の動作を行う部分には、図４と同一の番号を付し説明を略す。同図において、３１は基準発振器を含まないＰＬＬ回路、４２は分周器である。

【００２４】本実施例は、第４の局部発振器４０の発振信号を分周して、局部発振器２６の発振周波数を制御す

るＰＬＬ回路３１の基準発振信号として用いることを特徴とする。高精細テレビジョン信号のＩＦ信号をベースバンドへ周波数変換する第４ミクサ３９では、周波数精度の高い局部発振信号が必要になる。従って、第４の局部発振器４０ではSAW共振子等を用いた周波数安定度の高い発振回路を構成している。このため、上記第２の実施例でＰＬＬ回路３１に含まれていた基準発振器に替えて、第４の局部発振器４０の発振信号を分周器４２で分周して用いた。

【００２５】本実施例では、第４の実施例で述べた効果に加え、第４の局部発振器４０の発振信号を分周器４２で分周してＰＬＬ回路３１の基準発振信号として用いるので、受信装置の発振器部分の回路規模低減が図れると共に、高精細テレビジョン信号の高精度な復調が可能である。

【００２６】以下、高精細テレビジョン信号の形式に基づいて、より具体的な実施例を図面を用いて説明する。

【００２７】図６は本発明の第６の実施例を示す受信装置のブロック図、図７は第６の実施例を補足する信号帯域図である。図６において、図５に示した実施例と同様の動作を行う部分には、図５と同一の番号を付し説明を略す。同図において、６０は高精細テレビジョン信号用の第１のＩＦフィルタ、６１は高精細テレビジョン信号用の第２のＩＦフィルタ、６２は第５のＩＦ増幅器、６３は第５ミクサ、６４、６５はローパスフィルタ、６６、６７はベースバンド信号用増幅器である。

【００２８】本実施例は、図７に示すベースバンド信号帯域を有する高精細テレビジョン信号と、ＮＴＳＣ信号を受信することを特徴とする。図７には高精細テレビジョン信号の周波数スペクトルに、比較のためＮＴＳＣ信号の映像及び音声搬送波（ｆｖ、ｆｓ）と色副搬送波（ｆｃ）を示した。６ＭＨｚの信号帯域に圧縮する高精細テレビジョン信号の形式については、米国等で検討されており、例えば福井氏「次世代テレビ方式の欧米における動向」ｐｐ．５０６－５０８、テレビジョン学会１９９２年年次大会、等に詳細に述べられている。高精細テレビジョン信号はＮＴＳＣ信号と同一のチャネルで伝送される場合も考慮されており、ＮＴＳＣ信号からの干渉妨害を避けるため、ＮＴＳＣ信号中エネルギーの高い映像及び音声搬送波の近傍には、予め高精細テレビジョン信号のスペクトルを配置しない図７に示した信号を用いることが提案されている。図７はＱＡＭされた高精細テレビジョン信号に対し、ＮＴＳＣ信号の映像搬送波周波数以下を優先度の高い信号（ＨＰ部）、映像搬送波周波数以上をそれ以外の信号（ＳＰ部）に分割して伝送する信号形式である。本実施例は二重周波数変換された高精細テレビジョン信号の第２ＩＦ信号から、ＳＡＷフィルタで構成した高精細テレビジョン信号用の第１のＩＦフィルタ６０及び第２のＩＦフィルタ６１により、このＨＰ部、ＳＰ部を分離し、第２のＩＦ増幅器１６及び第５のＩＦ増幅器６２で増幅した後、第４ミクサ３９及び第５ミクサ６３でそれぞれベースバンドへ周波数変換する。ベースバンドに変換したＨＰ部、ＳＰ部はそれぞれローパスフィルタ６４、６５を通過後、ベースバンド信号用増幅器６６、６７で所望の信号レベルとして高精細テレビジョン信号用復調器５０へ入力し、復調する。なお、高精細テレビジョン信号用の第１のＩＦフィルタ６０及び第２のＩＦフィルタ６１は、それぞれ分離されたＳＡＷフィルタで構成したが、同一の基板上に構成されたフィルタでも帯域分離は可能である。

【００２９】本実施例では、第５の実施例で述べた効果を有すると共に、図７に示した信号帯域の高精細テレビジョン信号に対し、二重周波数変換後、帯域を分割して信号処理を行うため、両帯域間の干渉や同一チャネルで伝送されるＮＴＳＣ信号からの妨害を十分に低減することが可能となる。

【００３０】図８は本発明の第７の実施例を示す受信装置のブロック図である。同図において、図６に示した実施例と同様の動作を行う部分には、図６と同一の番号を付し説明を略す。同図において、７０は第１のＱＡＭ検波器、７１は第２のＱＡＭ検波器、７２、７３は９０度移相器、７４は第１のキャリア及びクロック再生回路、７５は第２のキャリア及びクロック再生回路、７６は第５の発振器、７７は第６の発振器、７８はＡＦＣ電圧発生回路、５１はデータ復調器である。

【００３１】本実施例は、二重周波数変換された高精細テレビジョン信号の第２ＩＦ信号から、ＳＡＷフィルタで構成した高精細テレビジョン信号用の第１のＩＦフィルタ６０及び第２のＩＦフィルタ６１により、上記高精細テレビジョン信号のＨＰ部、ＳＰ部を分離し、第２のＩＦ増幅器１６及び第５のＩＦ増幅器６２で増幅した後、それぞれを第１及び第２のＱＡＭ検波器７０、７１で、第５及び第６の発振器７６、７７の発振信号を９０度移相器７２、７３で移相して互いに９０度の位相差を有する２信号を用いて検波する。この際、ＡＦＣ電圧発生回路７８で局部発振器２６の発振周波数を制御し、第１及び第２のキャリア及びクロック再生回路７４、７５でのキャリア及びクロック信号再生を最良状態となるように周波数制御を行う。検波された信号はデータ復調器５１へ入力し、復調する。なお、ここでは局部発振器２６の発振周波数を制御したが、第２の局部発振器２８の発振周波数を制御する構成や第５及び第６の発振器７６、７７の発振周波数を制御する構成でもよい。

【００３２】本実施例では、第６の実施例で述べた効果を有すると共に、図７に示した信号帯域の高精細テレビジョン信号のＨＰ部、ＳＰ部に対し、それぞれＱＡＭ復調を行うため、両帯域間の干渉や同一チャネルで伝送されるＮＴＳＣ信号からの妨害をさらに低減することが可能で、より高精度のデータ復調が可能となる。また、局部発振器２６の発振周波数を制御してＱＡＭ復調を行う

ため、高精度な高精細テレビジョン信号の復調が可能となる。

【００３３】図９は本発明の第８の実施例を示す受信装置のブロック図、図１０は第８の実施例を補足する信号帯域図である。図９において、図２に示した実施例と同様の動作を行う部分には、図２と同一の番号を付し説明を略す。同図において、５２は高精細テレビジョン信号用復調器である。

【００３４】本実施例は、図１０に示すベースバンド信号帯域を有する高精細テレビジョン信号と、ＮＴＳＣ信号を受信することを特徴とする。図１０には図７と同様高精細テレビジョン信号の周波数スペクトルに、比較のためＮＴＳＣ信号の映像及び音声搬送波（ｆｖ、ｆｓ）と色副搬送波（ｆｃ）を示した。同図は６ＭＨｚの信号帯域に圧縮する高精細テレビジョン信号の他の形式として４値の残留側波帯振幅変調（ＶＳＢ）を用いた信号帯域図である。本実施例は二重周波数変換された高精細テレビジョン信号の第２ＩＦ信号をＳＡＷフィルタで構成した高精細テレビジョン信号用のＩＦフィルタ１５で選択通過させ、第２のＩＦ増幅器１６で増幅した後、ＮＴＳＣ信号のＩＦ信号と同様に、ＡＭ復調器３４に入力し、復調する。ＮＴＳＣ信号を復調した場合にはＡＭ復調器３４から復調信号を出力するが、高精細テレビジョン信号を復調した場合にはさらに高精細テレビジョン信号用復調器５２に入力し、復調を行う。なお、同一チャネルで伝送されるＮＴＳＣ信号からの妨害を低減するため、ＡＭ復調器３４の中には高精細テレビジョン信号受信時に動作する上記ＮＴＳＣ信号の搬送波、副搬送波を除去するノッチフィルタを設けている。また、入力フィルタ６に、１チャネル分の帯域幅を有し、局部発振器２６の発振周波数に追従してその通過帯域の中心周波数を可変するバンドパスフィルタを設け、希望受信信号に比べて強電界の妨害信号が入力した場合にも、妨害の発生を低減している。

【００３５】本実施例では、第２の実施例で述べた効果に加え、高精細テレビジョン信号もＡＭ変調されているので、高精細信号の復調の一部をＮＴＳＣ信号の復調器を用いて行うことができ、またＡＧＣ電圧やＡＦＣ電圧の制御も共通に行うことができ、受信装置の回路構成が簡略化され、回路規模を縮小することが可能となる。また、本実施例では高精細テレビジョン信号用ＩＦフィルタ１５とＮＴＳＣ信号用ＩＦフィルタ２４を別個に設けたが、高精細テレビジョン信号とＮＴＳＣ信号の残留側波帯幅やロールオフ特性が類似している場合には両者を共有することができ、さらに回路規模が縮小される。

【００３６】図１１は本発明の第９の実施例を示す受信装置のブロック図、図１２は第９の実施例を補足する信号帯域図である。同図において、図２及び図８に示した実施例と同様の動作を行う部分には、図２及び図８と同一の番号を付し説明を略す。同図において、５３は高精細テレビジョン信号用データ復調器である。

【００３７】本実施例は、図１２に示すベースバンド信号帯域を有する高精細テレビジョン信号と、ＮＴＳＣ信号を受信することを特徴とする。図１２には図７と同様高精細テレビジョン信号の周波数スペクトルに、比較のためＮＴＳＣ信号の映像及び音声搬送波（ｆｖ、ｆｓ）と色副搬送波（ｆｃ）を示した。同図は６ＭＨｚの信号帯域に圧縮する高精細テレビジョン信号の他の形式として１６値あるいは３２値のＱＡＭ変調を用いた信号帯域図である。本実施例は二重周波数変換された高精細テレビジョン信号の第２ＩＦ信号をＳＡＷフィルタで構成した高精細テレビジョン信号用のＩＦフィルタ１５で選択通過させ、第２のＩＦ増幅器１６で増幅した後、第１のＱＡＭ検波器７０で、第５の発振器７６の発振信号を９０度移相器７２で移相して互いに９０度の位相差を有する２信号を用いて検波する。この際、ＡＦＣ電圧発生回路７８で局部発振器２６の発振周波数を制御し、第１及び第２のキャリア及びクロック再生回路７４、７５でのキャリア及びクロック信号再生を最良状態となるように周波数制御を行う。検波された信号はデータ復調器５３へ入力し、復調する。なお、ここでは局部発振器２６の発振周波数を制御したが、第２の局部発振器２８の発振周波数を制御する構成や第５の発振器７６の発振周波数を制御する構成でもよい。また、同一チャネルで伝送されるＮＴＳＣ信号からの妨害を低減するため、ＱＡＭ検波器７０には上記ＮＴＳＣ信号の搬送波、副搬送波を除去するためノッチフィルタを設けている。

【００３８】本実施例では、第２の実施例で述べた効果に加え、局部発振器２６の発振周波数を制御してＱＡＭ復調を行うため、高精度な高精細テレビジョン信号の復調が可能となる。

【００３９】なお、これまで述べた実施例は、ＮＴＳＣ信号と高精細テレビジョン信号を信号入力端子１から入力し、分配器５で分配する構成としているが、入力端子を２個設けて、それぞれの信号処理部に入力する構成としても同様な効果が得られる。

【００４０】また、これまでの実施例は、ＮＴＳＣ信号と高精細テレビジョン信号を受信する受信装置として、主にＴＶ、ＶＴＲ機器での使用を述べたが、前記受信装置はディジタル通信等の通信分野へ応用しても同様な効果が得られる。

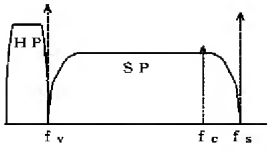
【００４１】

【発明の効果】本発明によれば、ＮＴＳＣ信号と６ＭＨｚの帯域に圧縮されて伝送する高精細テレビジョン信号を受信可能な受信装置を提供できる。また、選局回路、局部発振器、第１ミクサをＮＴＳＣ信号と高精細テレビジョン信号で共用し、ＩＦフィルタと復調器をＮＴＳＣ信号と高精細テレビジョン信号用に個別に設けることで、回路規模を低減したＮＴＳＣ信号、高精細テレビジョン信号を受信する受信装置が構成できる。

【図面の簡単な説明】
【図１】本発明の第１の実施例を示すブロック図である。
【図２】第２の実施例を示すブロック図である。
【図３】第３の実施例を示すブロック図である。
【図４】第４の実施例を示すブロック図である。
【図５】第５の実施例を示すブロック図である。
【図６】第６の実施例を示すブロック図である。
【図７】第６の実施例を補足する信号帯域図である。
【図８】第７の実施例を示すブロック図である。
【図９】第８の実施例を示すブロック図である。
【図１０】第８の実施例を補足する信号帯域図である。
【図１１】第９の実施例を示すブロック図である。
【図１２】第９の実施例を補足する信号帯域図である。
【図１３】従来例を示すブロック図である。
【符号の説明】
１…信号入力端子、
２…選局信号入力端子、
３…高精細テレビジョン信号出力端子、
４…ＮＴＳＣ信号出力端子、
５…分配器、
７、９、１８、２０…可変減衰器、
８、１９…第１、第２のＲＦ増幅器、
１０…第１ミクサ、
１１…第１ＩＦフィルタ、
１２…第１ＩＦ増幅器、
１３…第２ミクサ、
１４…第１のＩＦ増幅器、
１５、６０、６１…高精細テレビジョン信号用ＩＦフィルタ、
１６…第２のＩＦ増幅器、
１７、２１…可変同調回路、
２２…第３ミクサ、
２３…第３のＩＦ増幅器、
２４…ＮＴＳＣ信号用ＩＦフィルタ、
２５…第４のＩＦ増幅器、
２６…第３の局部発振器、
２７…高精細テレビジョン信号用第１の局部発振器、
２８…第２の局部発振器、
２９、３０、３６、４１、６４、６５、…ローパスフィルタ、
３１、３２…ＰＬＬ回路、
３３、５０、５１、５２、５３…高精細テレビジョン信号用復調器、
３４…ＮＴＳＣ信号用復調器、
３５…高精細テレビジョン信号用レベル検出器、
３７…ＡＧＣ電圧増幅器、
３９…第４ミクサ、
４０…第４の局部発振器、
４２…分周器、
６２…第５のＩＦ増幅器、
６３…第５ミクサ、
６６、６７…ベースバンド信号用増幅器、
７０、７１…ＱＡＭ検波器、
７２、７３…９０度移相器、
７４、７５…キャリア及びクロック再生回路、
７６、７７…基準発振器、
７８…ＡＦＣ電圧発生器。

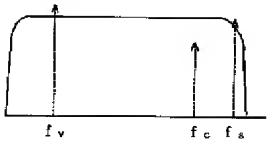
【図７】

図 7



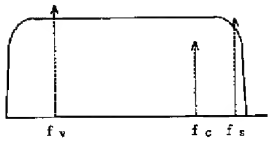
【図１０】

図 10



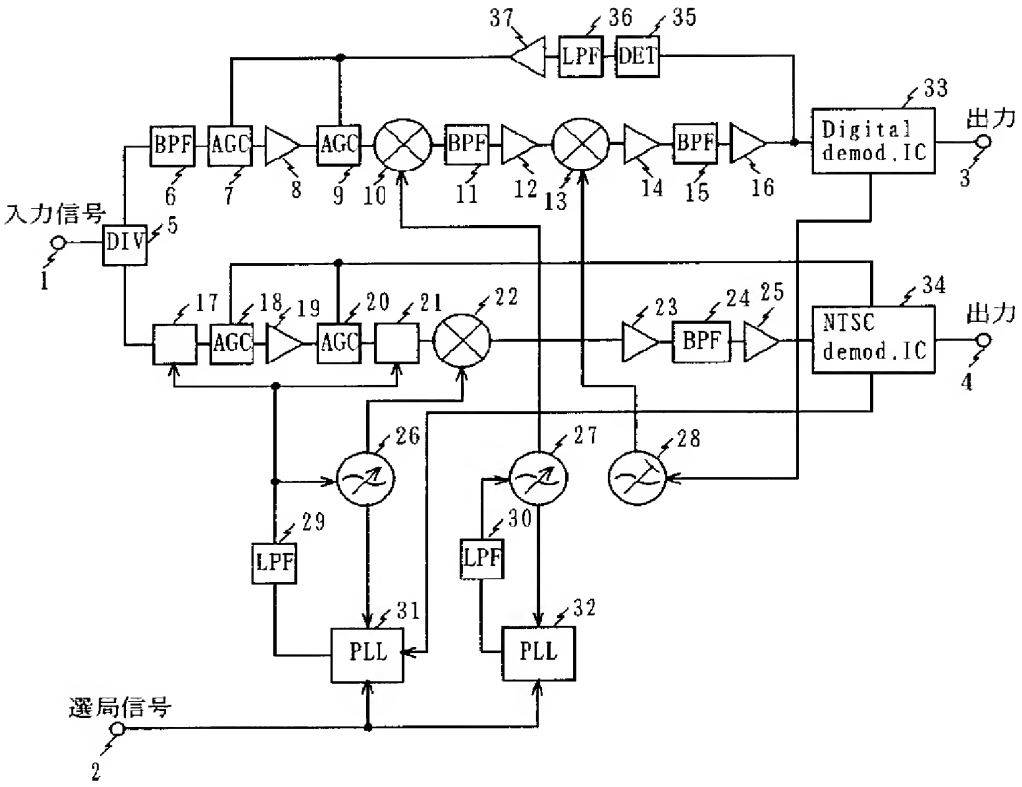
【図１２】

図 12



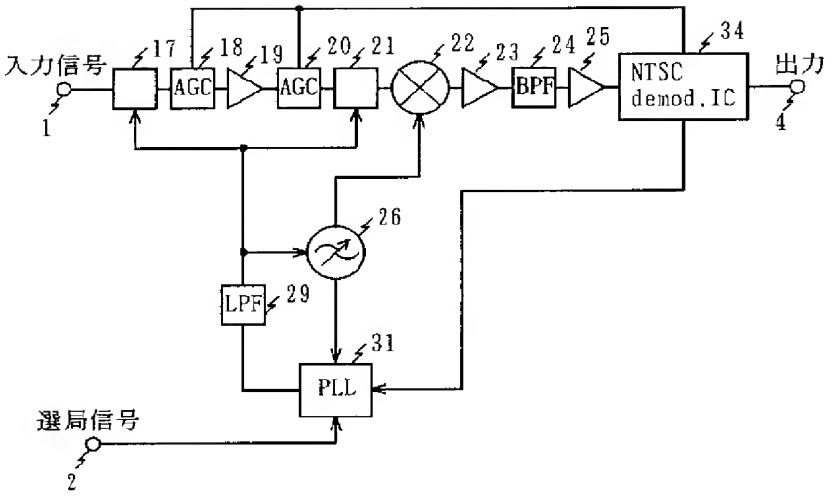
【図１】

図 1


37
36
35
LPF
DET
33
Digital
demod.IC
出力
3
BPF
AGC
AGC
BPF
BPF
6
7
8
9
10
11
12
13
14
15
16
入力信号
1
DIV
5
17
18
19
20
21
22
23
24
25
AGC
AGC
BPF
34
NTSC
demod.IC
出力
4
26
27
28
29
30
LPF
LPF
31
32
PLL
PLL
選局信号
2

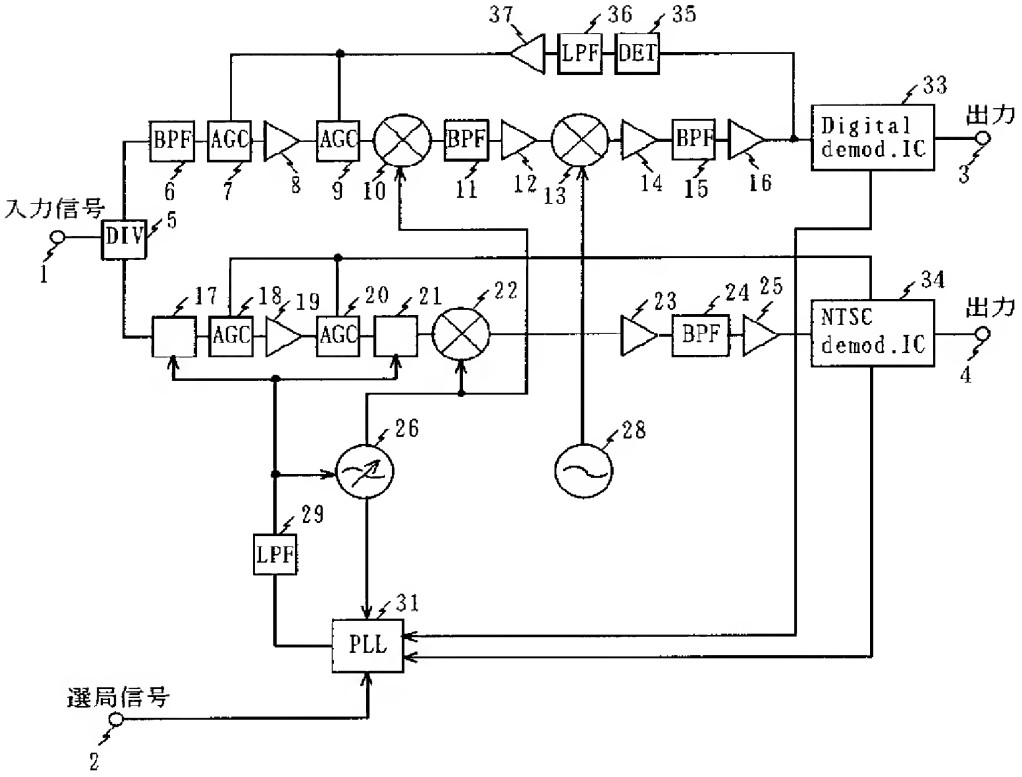
【図１３】

図 13


入力信号
1
17
18
19
20
21
22
23
24
25
AGC
AGC
BPF
34
NTSC
demod.IC
出力
4
26
LPF
29
31
PLL
選局信号
2

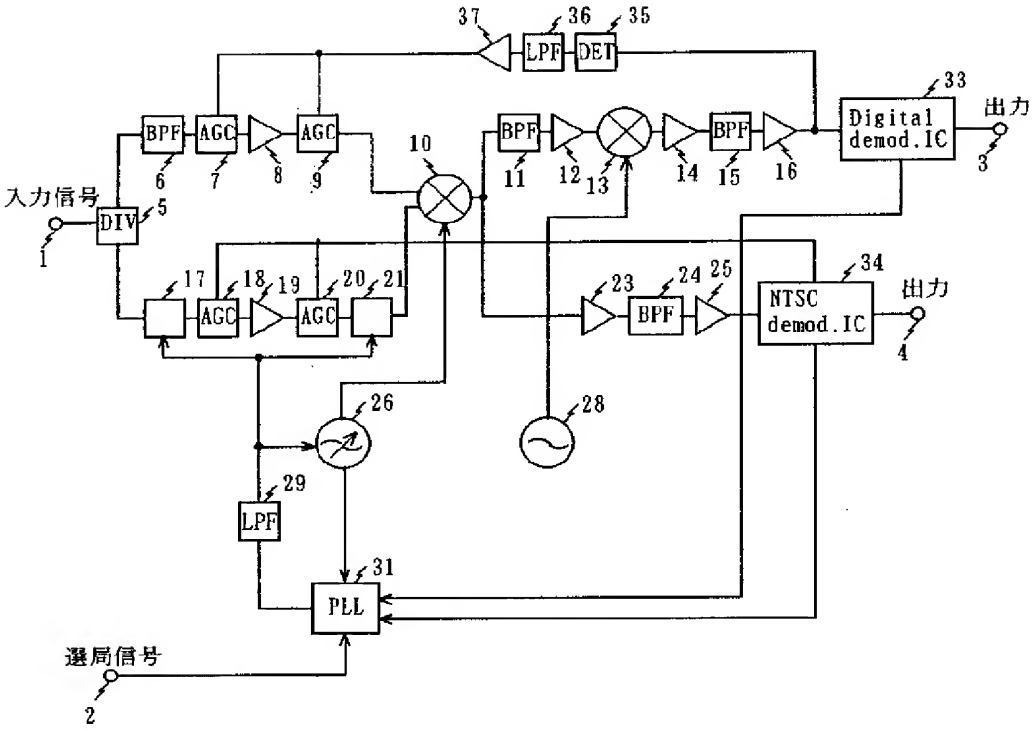
【図２】

図　２


37
36
35
LPF
DET
33
Digital
demod.IC
出力
3
BPF
AGC
AGC
BPF
BPF
6
7
8
9
10
11
12
13
14
15
16
入力信号
1
DIV
5
17
18
19
20
21
22
23
24
25
34
NTSC
demod.IC
出力
4
AGC
AGC
BPF
26
28
29
LPF
31
PLL
選局信号
2

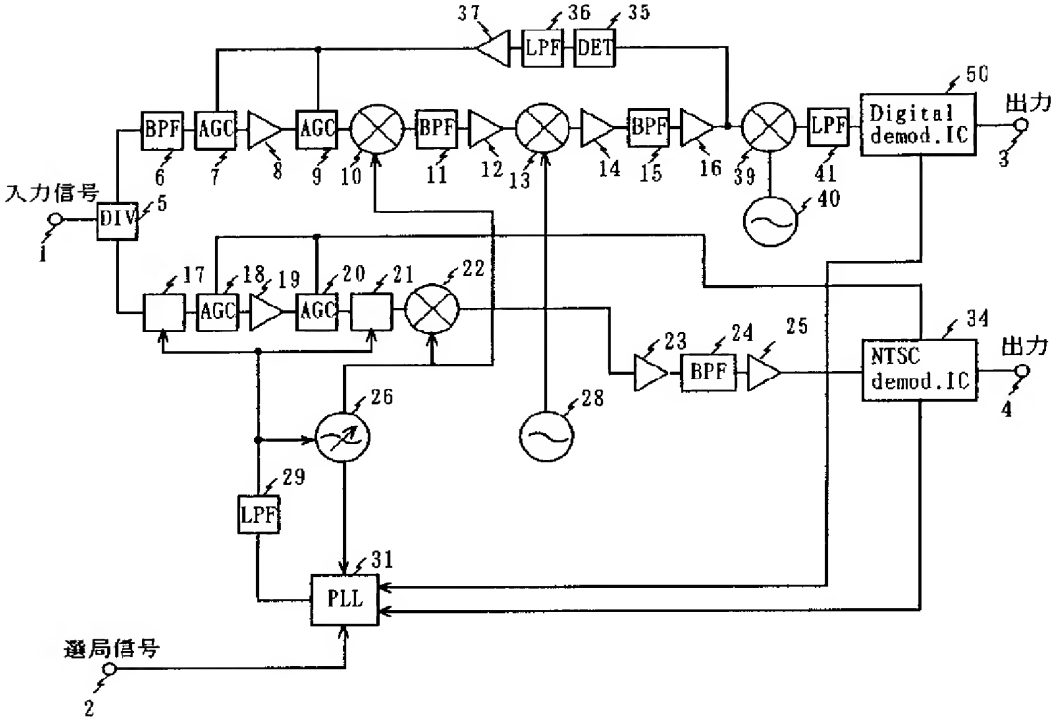
【図３】

図　３


37
36
35
LPF
DET
33
Digital
demod.IC
出力
3
BPF
AGC
AGC
10
BPF
BPF
入力信号
1
DIV
5
6
7
8
9
11
12
13
14
15
16
17
18
19
20
21
23
24
25
34
NTSC
demod.IC
出力
4
26
28
29
LPF
31
PLL
選局信号
2

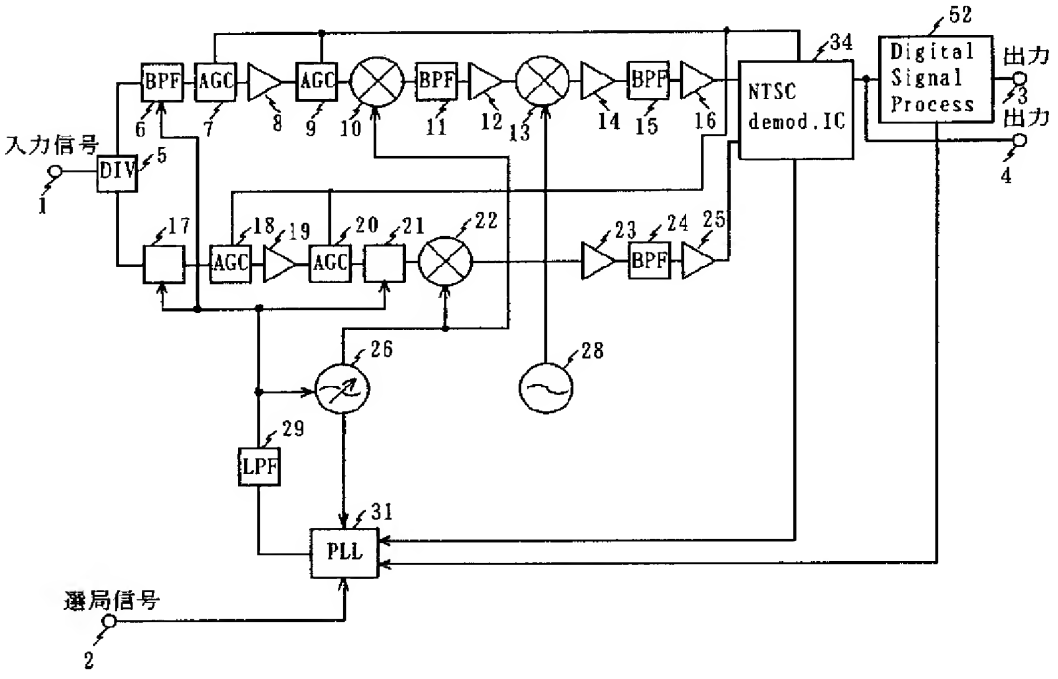
【図４】

図　４


37
36
35
LPF
DET
50
Digital
demod.IC
出力
3
BPF
AGC
AGC
BPF
BPF
BPF
LPF
6
7
8
9
10
11
12
13
14
15
16
39
41
40
入力信号
1
DIV
5
17
18
19
20
21
22
AGC
AGC
23
24
25
BPF
34
NTSC
demod.IC
出力
4
26
28
29
LPF
31
PLL
選局信号
2

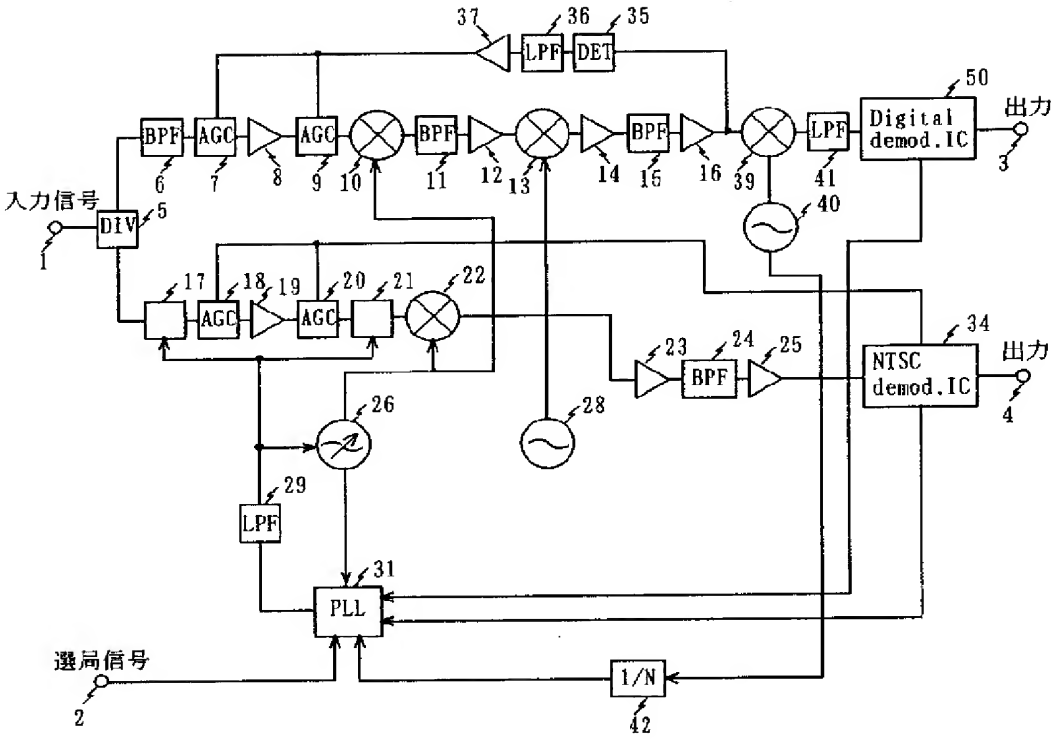
【図９】

図　９


52
Digital
Signal
Process
出力
3
出力
4
34
NTSC
demod.IC
BPF
AGC
AGC
BPF
BPF
BPF
6
7
8
9
10
11
12
13
14
15
16
入力信号
1
DIV
5
17
18
19
20
21
22
AGC
AGC
23
24
25
BPF
26
28
29
LPF
31
PLL
選局信号
2

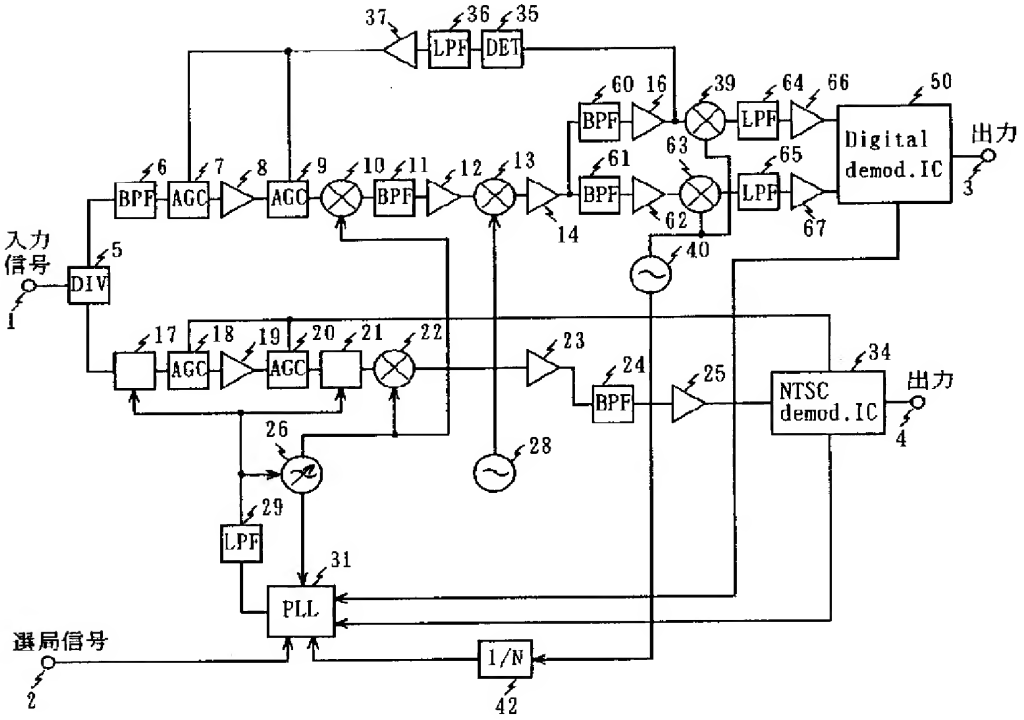
【図５】

図　５


37
36
35
LPF
DET
50
出力
BPF
AGC
AGC
BPF
BPF
LPF
Digital
demod.IC
入力信号
DIV
5
6
7
8
9
10
11
12
13
14
15
16
39
41
40
3
1
17
18
19
20
21
22
23
24
25
34
NTSC
demod.IC
出力
4
26
28
29
LPF
31
PLL
選局信号
1/N
2
42

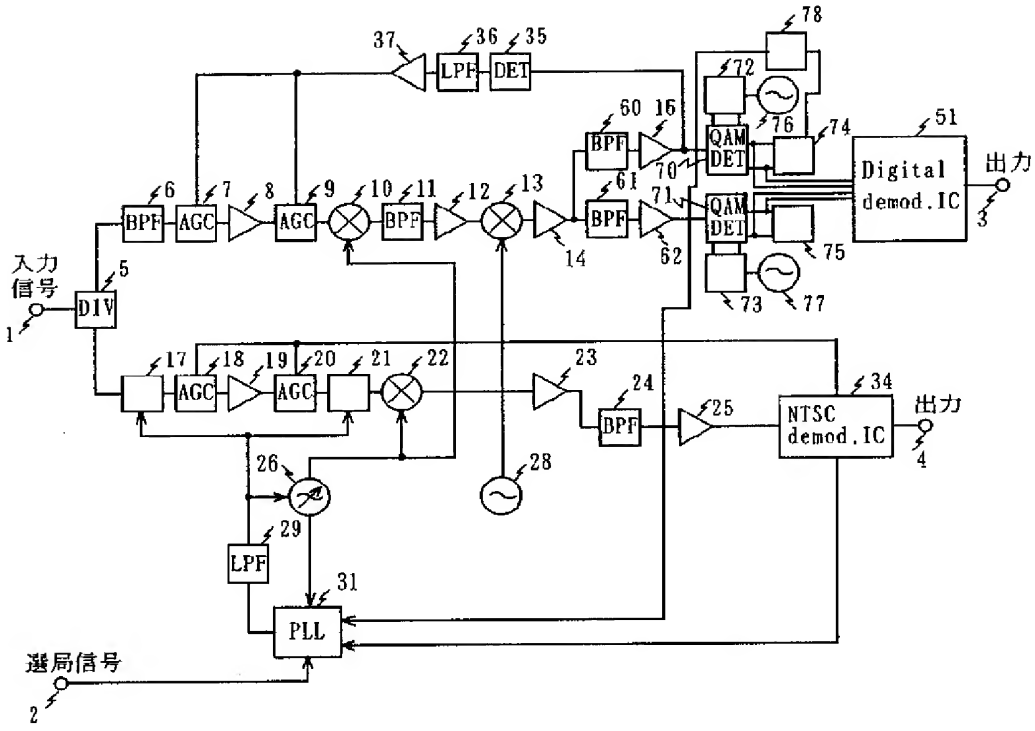
【図６】

図　６


37
36
35
LPF
DET
60
16
39
64
66
50
BPF
LPF
Digital
demod.IC
出力
3
63
61
65
6
7
8
9
10
11
12
13
BPF
AGC
AGC
BPF
BPF
LPF
14
62
67
入力
信号
1
5
DIV
40
17
18
19
20
21
22
23
24
25
34
AGC
AGC
BPF
NTSC
demod.IC
出力
4
26
28
29
LPF
31
PLL
選局信号
2
1/N
42

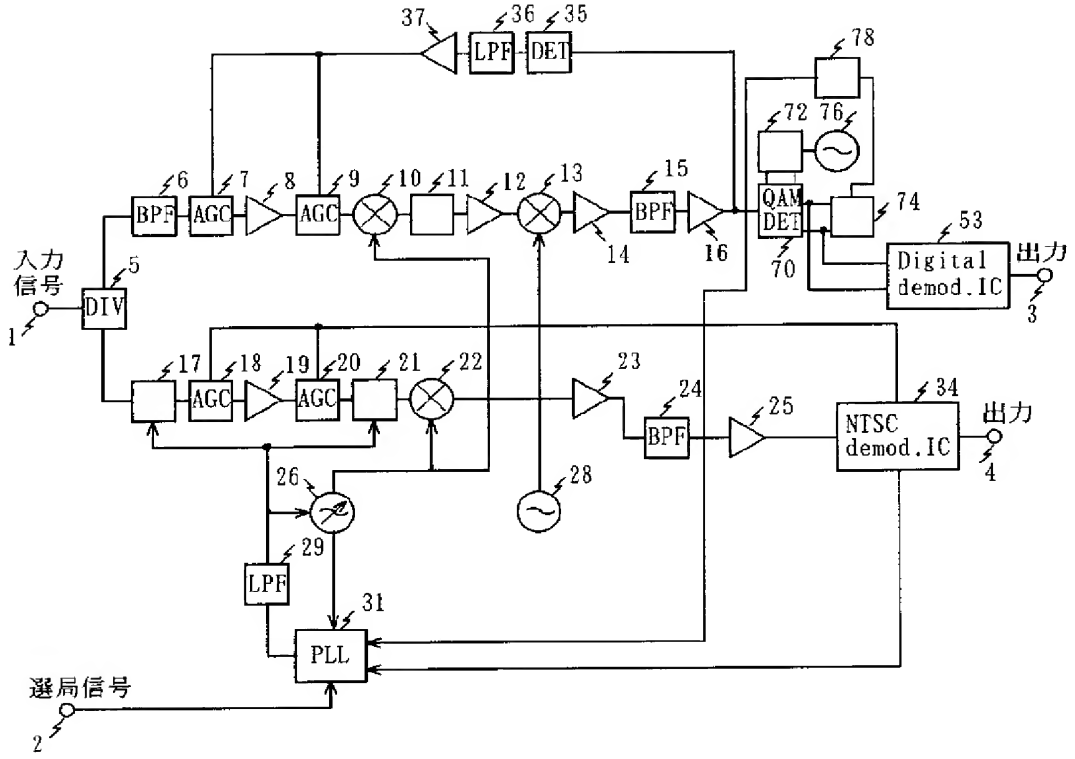
【図８】

図　８


入力
信号
1
DIV
5
BPF
6
AGC
7
8
AGC
9
10
BPF
11
12
13
14
BPF
60
16
70
BPF
61
71
62
QAM
DET
QAM
DET
72
73
76
77
74
75
78
51
Digital
demod.IC
出力
3
37
LPF
36
DET
35
17
AGC
18
19
AGC
20
21
22
23
BPF
24
25
NTSC
demod.IC
34
出力
4
26
28
29
LPF
31
PLL
選局信号
2

【図１１】

図 11


37
36
35
LPF
DET
78
72
76
6
7
8
9
10
11
12
13
15
BPF
AGC
AGC
BPF
14
16
QAM
DET
70
74
53
Digital
demod.IC
出力
3
入力
信号
1
5
DIV
17
18
19
20
21
22
23
24
25
34
AGC
AGC
BPF
NTSC
demod.IC
出力
4
26
28
29
LPF
31
PLL
選局信号
2